

# ***Gielisella* gen. n., a new genus and two new species from southern Spain (Lepidoptera: Elachistidae: Parametriotinae) with a catalogue of parametriotine genera**

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<http://zoobank.org/B34CC9BF-5C8F-40E1-BE7D-85E754F898D6>

Received 14 June 2017; accepted 26 August 2017; published: 3 November 2017

Subject Editor: David C. Lees.

**Abstract.** The genus *Gielisella* **gen. n.**, belonging to the Elachistidae: Parametriotinae is described with two new species from southern Spain: its type species *G. clarkeorum* **sp. n.** and *G. nigripalpis* **sp. n.**, both only known from adults collected at light. DNA barcodes of both species are provided. The taxonomic history of the Parametriotinae is discussed and a catalogue of the 35 recognised genera is provided as appendix. The arguments for erecting a new genus are discussed and we hypothesize that this constitutes an overlooked native Palaearctic element, although we cannot completely rule out the possibility of imported exotic species.

## **Introduction**

With almost 20,000 described species, the Gelechioidea forms one of the mega-diverse superfamilies of the Lepidoptera, exhibiting maybe the largest diversity of life histories anywhere in Lepidoptera, including saprophagy, entomophagy, all kinds of phytophagy such as leafmining, galling, case-building, webbing, etc. (Kaila et al. 2011; Heikkilä et al. 2014). Phylogenetically the superfamily has a chequered history, particularly concerning the family level classification, with genera and subfamilies switching from one to another family and family size changing frequently (Minet 1990; Hodges 1998; Kaila 2004; Kaila et al. 2011; van Nieukerken et al. 2011; Heikkilä et al. 2014). One of the taxa that has such a chequered history is the group until recently known as the family Agonoxenidae, or the subfamily Agonoxeninae in Elachistidae. Once it was shown that the type genus *Agonoxena* Meyrick, 1921 does probably not form a monophylum with the other genera, these were removed to the subfamily Parametriotinae (Elachistidae) (Kaila 2004; Kaila et al. 2011; Heikkilä et al. 2014), of which more than 50 species are known in the Palaearctic Region with 16 species in six genera in Europe (Koster and Sinev 2003; Sinev and Koster 2013).

In 1978 Cees Gielis collected a small unknown female gelechioid moth in Spain, province of Granada. The senior author and Sergey Sinev examined the specimen when preparing the manuscript for the series Microlepidoptera of Europe (Koster and Sinev 2003) and concluded that it belonged to an unknown genus and species in the Agonoxenidae. However, they considered the single female specimen insufficient for the description of a new genus and species and did not include it in their treatment (Koster and Sinev 2003).

In February 2013 the senior author became aware of new material of this species collected by Peter and Ginny Clarke in Almería, Spain, brought to his attention by Martin Corley. Photos of the female genitalia confirmed that the species was conspecific with the unknown species collected years ago in Granada. More material was gathered in the same locality the following years, and surprisingly turned out to belong to two closely related species.

Although we were convinced that the new species belong to Parametriotinae, the lack of a phylogenetic framework or even a taxonomic catalogue made our search for the correct placement of these species almost impossible. After we canvassed several specialists, we considered several possibilities, from an introduction from Australia to an unknown and hitherto overlooked Palearctic genus. In view of the lack of a catalogue and of the fact that the composition of the subfamily has been considerably revised recently, we were prompted to prepare a generic catalogue of the subfamily, here published as an appendix. We also provide a brief diagnosis of the subfamily, and a brief taxonomic history.

Since we were unable to match our new species in external morphology or in genitalia to any of the described genera, we describe here the new genus *Gielisella* and two new species, and provide DNA barcodes of both species.

## Methods

Genitalia were dissected following the methodology presented by Robinson (1976) and Brown (1997). It is often impractical to spread the valvae of the male genitalia of Parametriotinae in the ventral position, because of the rigid structure of the vinculum; we therefore avoided spreading. Adults are illustrated by water colours prepared by JCK and with photographs prepared by EvN. Watercolours are primarily prepared from a single specimen, but details may be taken from other specimens; in Fig. 1 the abdomen is taken from a different specimen; the left wings and antennae in the watercolours are not painted, but added in Photoshop as mirror images of the right counterparts. Drawings of the wing venation and the genitalia were made with a compound microscope using the camera lucida method. For this purpose a strong light source (slide projector) was used for the illumination on the mirror of the microscope. A prism was placed on top of the microscope eyepiece to bend the projection 90° and project the subject on drawing paper. All outlines were drawn by pencil and later set in Indian ink. The head in Fig. 3 was drawn and adjusted on the basis of a photograph.

Photographs of moths were prepared with an AxioCam digital camera attached to a motorized Zeiss SteREO Discovery V12, using the Module Extended Focus in the Carl Zeiss AxioVision software to prepare a picture in full focus from a Z-stack of about 10 to 25 individual photos. Genitalia were photographed with a similar AxioCam camera on a manually operated Zeiss Axioskop H, with just a single exposure.

Morphological terms follow Koster and Sinev (2003), except for the use of phallus rather than aedeagus and the separation of the veins Rs (radial sector) from R, following most modern Lepidoptera treatments (Kristensen 2003).

The distribution map was prepared with DMAP 7.2c (Morton 2000).

DNA barcodes were derived from extracts taken from either legs or the abdomen, following the procedures outlined by van Nieukerken et al. (2012). Sequence data have been deposited in the public BOLD dataset “*Gielisella* [DS-GIELIS]” [doi: 10.5883/DS-GIELIS] and GenBank (Table 1). For comparison we downloaded publicly available DNA barcodes of several other Para-

**Table 1.** *Gielisella* spp., registration numbers, BOLD numbers, COI gene length and GenBank accession numbers. See also BOLD dataset <http://dx.doi.org/10.5883/DS-GIELIS>.

Taxon	Type status	Sample Id	BIN	BOLD Process Id	COI-5P	GenBank	Collection
<i>Gielisella clarkeorum</i>	Holotype	RMNH.INS.544306	BOLD:ACU7245	LRMNH048-15	658	MF322622	RMNH
<i>Gielisella clarkeorum</i>	Paratype	RMNH.INS.544295	BOLD:ACU7245	LRMNH014-15	658	MF322624	RMNH
<i>Gielisella clarkeorum</i>	Paratype	RMNH.INS.544296	BOLD:ACU7245	LRMNH015-15	658	MF322623	coll. Clarke
<i>Gielisella nigripalpis</i>	Holotype	RMNH.INS.544307	BOLD:ACY4816	LRMNH049-15	658	MF322625	RMNH

metriotinae from the BOLD databases (Ratnasingham and Hebert 2007). The figured Neighbour Joining tree was prepared with the tree building tools on BOLD. The tree should not be regarded as showing phylogenetic relationships, since the selection of barcodes was done *a priori* and there are other, unrelated species, that have barcodes closer to some of these species.

Abbreviations

- ANIC
- Australian National Insect Collection, CSIRO, Canberra, ACT, Australia.
- NHMUK
- The Natural History Museum, London, United Kingdom.
- BOLD
- Barcoding of Life Datasystems, <http://www.barcodinglife.com/>
- EvN
- Erik J. van Nieukerken
- JCK
- J.C. (Sjaak) Koster
- MNCN
- Museo Nacional de Ciencias Naturales, Madrid, Spain.
- PGC
- Collection Peter & Ginny Clarke, Glasbury on Wye, United Kingdom.
- RMNH
- Naturalis Biodiversity Center, Leiden, the Netherlands.
- TMSA
- Ditsong Museum of Natural History (former Transvaal Museum), Pretoria, South Africa.
- ZIAN
- Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

Systematics

Parametriotinae

Diagnosis

The subfamily is very heterogeneous and members are therefore difficult to distinguish from other families in Gelechioidea on external characters alone. There are similarities to species of Coleophoridae, Cosmopterigidae and Momphidae. If the forewing has a series of up to ten tufts of raised scales, more or less arranged in pairs, the moth belongs to the genera *Leptozestis* Meyrick, 1924 or *Trachydora* Meyrick, 1897. The male genitalia in Parametriotinae are characterized by the divided gnathos with at each arm the typical distal appendage in the shape of a spherical process with spines or peg-like setae or by a bundle of teeth. In the female genitalia is the presence of a small to large antrum with which the underneath connected ductus seminalis in combination with the long, rather narrow ductus bursae and the elongated corpus bursae are characteristic. Examination of the genitalia is necessary for proper identification. Some Roeslerstammiidae (e.g. *Vanicela* Walker, 1864) have confusingly similar male genitalia with a similar paired spinose gnathos, but can be separated by the absence of scaling on the haustellum (Dugdale 1988, R.B.J. Hoare pers. comm.).

## Description

Forewing length between ca 3–10 mm. Head smooth, neck tufts slightly raised, ocelli absent, haustellum well developed and scaled. Antenna from three-fourths length to longer than length of forewing, scape often with pecten. Labial palpi rather long and porrect, segment three angled upwards, segment two often shorter than segment two and often rough scaled ventrally, sometimes with protruding bundle longer than segment; maxillary palpi very short.

Forewing and hindwing lanceolate to very lanceolate, most genera with two to ten tufts of raised scales, sometimes with tubercular silvery metallic spots. Forewing with 11 veins, Rs3 and Rs4 stalked, M2, M3, CuA1 and CuA2 often from posterior end of cell and sometimes stalked. Hindwings with 8–10 veins, Sc + R to beyond middle of wing, rarely ending before middle; M1 and M2 stalked. Tibia of midleg apically with one pair of spurs of unequal length, tibia hindleg medially and apically with pair of spurs of unequal length and dorsally with comb of long hairs.

Tergites of abdomen without specialized scales or spines; apodemes tergite I strong and anteriorly widened, semi-circular to straight, apodemes tergite II long and thin, sometimes longer than apodemes of tergite I.

Male genitalia. Uncus present, but often weakly developed and hardly noticeable as small lobe(s); tegumen well-developed, often tapering distally; gnathos as separated pair of arms ending in spherical process with many with rows of spines or peg-like setae or as bundle of teeth; vinculum narrow to rather broad; saccus from small or even absent to very long and rod-shaped; anellus lobes pronounced and often distally dentose; juxta lobes present; valvae large and simple, sometimes small and rounded, weakly sclerotized, occasionally with costal lobe; phallus mainly long, cylindrical and often curved, sometimes short and tapering or distally hooked.

Female genitalia. Apophyses posteriores from almost similar in length to more than ten times as long as apophyses anteriores; sclerotization of tergite VIII can be of diagnostic importance; antrum rather small to very wide, sometimes with sclerotization; ductus bursae long and slender; ductus seminalis attached just anterior of antrum; corpus bursae elongate with a single signum or without signum.

## Biology

Where known, larvae of Parametriotinae are bark- or twig-borers, fruit borers, leaf miners or gall makers on a variety of woody and herbaceous plants of various families. Larvae of European species have been found on Eudicot hosts of the following families: Asteraceae, Fagaceae, Rosaceae, Salicaceae, and Malvaceae (Koster and Sinev 2003). In other parts of the world Theaceae, Euphorbiaceae, Proteaceae, Myrtaceae and the conifers Araucariaceae and Cupressaceae have also been recorded as hostplants (Common 1990; Hodges 1997; Hodges 1998; Landry and Adamski 2004).

## Taxonomic history of Elachistidae: Parametriotinae

In the 19<sup>th</sup> and in most of the 20<sup>th</sup> century the species, now in Parametriotinae, were placed in several families. Originally, in most 19<sup>th</sup> century works, like most Microlepidoptera, they were simply placed in the Tineidae. After splitting the Tineidae into several smaller groups, sometimes recognised as families or subfamilies, they were considered either to belong to Cosmopterigidae (Meyrick 1928; Réal 1966; Bradley 2000) or Momphidae (Spuler and Meess 1910; Benander



1946; Riedl 1969), family names that were often used for the same groups of genera that share narrow wings, venational characters and often tufts of raised scales on the forewings.

The name *Agonoxena* was introduced by Meyrick (1921) while describing *Agonoxena argaula* Meyrick, 1921, the coconut flat moth. He placed this genus in Coleophoridae, but stated that it was an aberrant form of doubtful position. Meyrick (1924) described another species of this genus of coconut feeders, but the third species connected to coconut was described in the new genus *Haemolytis* Meyrick, 1926, due to the different venation. Since these genera did not really fit in Coleophoridae or other existing families, Meyrick erected a new family Agonoxenidae (Meyrick 1926) for these coconut feeders. Bradley (1966), in his comparative study of the coconut flat moth, described a fourth species and synonymized *Haemolytis* with *Agonoxena* (Agonoxenidae). In his opinion the family had a closer affinity with Oecophoridae than with Cosmopterigidae.

Kusnezov (1916) described the tiny moth *Parametriotes theae* Kuznetsov, 1916, the larvae of which were injurious to tea bush plantations in Transcaucasia, which he likewise placed in the family Coleophoridae. The generic name *Parametriotes* Kuznetsov, 1916 was derived from *Metriotes* Herrich-Schäffer, 1853 (Coleophoridae) because of its superficial similarity with his new genus. Fletcher (1929) transferred *Parametriotes* to the Cosmopterigidae. Much later, Căpușe (1971) placed this genus in a new family, the Parametriotidae.

In North America Hodges (1962) in his revision of the Cosmopterigidae of North America noticed that he could divide the species of Momphidae into two groups according to the genitalia. He provisionally divided these in ‘*Mompha* and allies’ and ‘*Blastodacna* and allies’.

Clarke (1962) described a new species in the genus *Homoeoprepes* Walsingham, 1909, earlier described in Lavernidae (a synonym of Momphidae) from the Neotropics. He simply used the family name Blastodacnidae as an established name in the title, but did not provide any reasons for that, nor a description, and therefore the family name is a *nomen nudum* and unavailable (Nye and Fletcher 1991). Nevertheless the name Blastodacnidae was widely used after that, either as family name or as subfamily name Blastodacninae, but was never made formally available.

Hodges (1978), in his new classification of the Gelechioidea, placed Agonoxenidae in his list after the Coleophoridae. He divided the family in the subfamilies Agonoxeninae and Blastodacninae. The latter was also divided in the tribus Blastodacnini and Parametriotini. Hodges placed only the genus *Agonoxena* (the species feeding on palms, Arecaceae) in the subfamily Agonoxeninae. He placed 11 genera in the Blastodacninae, tribus Blastodacnini and two genera in the tribus Parametriotini: *Parametriotes* Kuznetsov, 1916 and *Aetia* Chambers, 1880 (a junior homonym of *Aetia* Agassiz, 1847 (Nye and Fletcher 1991)). Both are now considered to be synonyms of *Haplochrois* Meyrick, 1897 (Sinev 1999).

Hodges’ concept of Agonoxenidae, including the Blastodacninae, was followed widely for the next two decades, including major checklists such as those for the Nearctic (Hodges 1983), Neotropics (Becker 1984) and Europe (Riedl 1996), albeit in slightly different arrangements with related families.

There were two notable exceptions: Minet (1990) was the first to recognise an enlarged Elachistidae, and regarded Agonoxeninae as a subfamily. This was amongst others followed in the Austrian checklist (Huemer and Tarmann 1993).

However, in Australia, Common (1990) kept both Agonoxenidae and Blastodacnidae as separate families, later repeated in the Australian checklist (Nielsen 1996a; b).

Up to the end of the 20<sup>th</sup> century, the classifications were still based on classical taxonomic authority, giving diagnostic characters, which may be sometimes termed as apomorphies, but without modern phylogenetic analyses. This changed when Hodges (1998) published – in the Handbook of Zoology – a phylogenetic cladistic analysis of the Gelechioidea, in which he recognised a much enlarged Elachistidae, as Minet did before, and downgraded Agonoxeninae as a subfamily, with Blastodacninae and Parametriotinae as synonyms. The synonymy of Blastodacninae and Parametriotinae was followed in the key work by Koster and Sinev (2003), but using it again as a full family, Agonoxenidae.

A more extensive cladistic analysis, still based on morphology alone, was published by Kaila (2004). He also recognised an expansive Elachistidae, comparable to that of Hodges (1998), but he separated Parametriotinae from the Agonoxeninae, since *Agonoxena* in his analysis grouped with Elachistinae s.s. and not with the other parametriotine genera. The mainly Australian genus *Trachydora* (erroneously named *Trachystola* in some places in Kaila's paper), previously placed in Cosmopterigidae: Chrysopeleiinae, also grouped with Parametriotinae in his analysis, that further comprised the genera *Blastodacna* Wocke, 1876, *Spuleria* Hofmann, 1898, *Heinemannia* Wocke, 1876 and *Microcolona* Meyrick, 1897.

The recent Lepidoptera family classification (van Nieukerken et al. 2011) accepted an expanded Elachistidae with Agonoxeninae and Parametriotinae as two of the eight subfamilies. Meanwhile, molecular studies were further changing the landscape of Lepidoptera classification, but the two pivotal studies until then (Regier et al. 2009; Mutanen et al. 2010) did not yet include any of the parametriotine or agonoxenine genera.

That changed in the first molecular phylogeny of Gelechioidea (Kaila et al. 2011), that included *Trachydora* Meyrick, 1897, *Microcolona*, *Heinemannia*, *Blastodacna* and *Chrysoclista* Stainton, 1854, but not *Spuleria*. These form a clade together with the mainly Australian genus *Leptozestis*, earlier considered as Cosmopterigidae: Chrysopeleiinae and the monotypic Australian *Coracistis* Meyrick, 1897, moved from the Stathmopodidae. Unfortunately the genus *Agonoxena* was not analysed, so that the placement of that genus could not be confirmed. This analysis also showed that such a large Elachistidae probably could not be maintained, as different subgroups ended up in different places in the tree. However, due to low support values, the classification was not yet changed.

In an elegant combined analysis of morphological and molecular characters, Heikkilä et al. (2014) finally provided a detailed phylogeny of Gelechioidea resulting in an updated classification. They dismantled the Elachistidae, removing most subfamilies to Depressariidae, and maintaining a much smaller Elachistidae, with subfamilies Elachistinae, Agonoxeninae and Parametriotinae. They analysed all eight genera that Kaila analysed in his previous papers, and in their maximum likelihood tree they group in two (relatively) well supported clusters: one mostly Australian (bootstrap support 100), with *Coracistis*, *Leptozestis* and *Trachydora*, the other (bootstrap support 88, 100 without *Microcolona*) with *Microcolona*, *Heinemannia*, *Blastodacna*, *Chrysoclista* and *Spuleria*. Unfortunately the type-genus *Haplochrois* (= *Parametriotes*) has not yet been analysed.

Whereas these phylogenetic studies only comprise a subset of genera, more detailed taxonomic studies have in recent years added information on the composition of the subfamily, and on the basis of these works together (Hodges 1997; Becker 1999; Sinev 1999; Landry and Adamski 2004; Sinev 2004) and several other sources we provide a tentative catalogue of 35 genera in this subfamily (appendix). Lvovsky (1996) erected a separate subfamily Lamprysticinae for the genus

*Lamprystica* Meyrick, 1914. On the basis of morphological characters alone, Heikkilä et al. (2014) could not place this genus in the classification. We tentatively leave this subfamily outside of Parametriotinae.

### ***Gielisella* gen. n.**

<http://zoobank.org/003CB133-A2ED-4CC7-ABDD-ACDDD2C679CA>

**Type-species.** *Gielisella clarkeorum*, sp. n., by present designation.

**Diagnosis.** The narrow forewings, the long, slender and curved gnathos arms with a pecten in the male genitalia, in combination with the wide antrum and the irregular row of spicules in the ductus bursae in the female genitalia are characteristic for *Gielisella*. Resembles in Europe species in the genus *Haplochrois* in the narrow forewings and hindwings, but can easily be distinguished by the more colourful forewings with tufts of raised scales and by the male and female genitalia.

The morphology of the male genitalia differs from all other known Parametriotinae genera. Especially, the gnathos arms are peculiar. In many genera the gnathos arms have distal spheres covered with rows of spicules. In *Chrysoclista*, the gnathos arms are strongly sclerotized with distal teeth. In the new genus, the gnathos arms bear a pecten of flat pegs.

**Description. Head** (Fig. 3). Appressedly scaled, frons slightly convex, vertex smooth, neck tufts with longer and more protruding scales, antennae about 6/7 length of forewing, ocelli absent. Scape with pecten. Labial palpus of moderate length, about two and half times of diameter compound eye, upturned, not reaching top of head, first segment short, second segment two times length of third, widening distally by rough ventral scaling, third segment cylindrical. Maxillary palpus small, three segmented, fold over base of proboscis. Haustellum well-developed, scaled at base.

**Thorax.** Smoothly scaled, including tegulae. Legs: Tibia foreleg with epiphysis; tibia midleg with two short apical spurs, inner 1/3 longer than outer; tibia hindleg with two medial spurs, inner 2× length of outer, and two apical spurs, inner slightly longer than outer, dorsally and ventrally with comb of long hairs, dorsal comb 2× as long.

**Wings** (Fig. 4). Forewing lanceolate, apex acuminate with two small tufts of raised scales, 12 veins present, cell closed, Sc, R, Rs1–4 to costa, Rs3 and Rs4 stalked, M1–CuA2 to dorsum, CuP very weak and not reaching dorsum, 1A+2A to dorsum, forked at base. Hindwing lanceolate, apex acuminate, frenulum single bristle in male, two bristles in female, 7 veins present, Sc+R and Rs to costa, M1–CuA2 to dorsum, 1A+2A rudimentary, Sc+R strongly curving towards costa in middle.

**Abdomen** (Fig. 5). Apodemes tergite I semi-circular, hooked at tip; apodemes tergite II long and thin, apodemes and venulae of sternite II long and narrow in male, in female hardly visible.

**Male genitalia** (Figs 6–9, 13–20). Uncus short and broad. Gnathos with long and slender arms, bearing pecten of flat pegs or setae. Tegumen large. Valvae long and weakly sclerotized. Anellus lobes large and apically denticulate. Vinculum broad. Phallus long, curved about 90 degrees, vesica with row of needle shaped cornuti.

**Female genitalia** (Figs 11, 21–25). Antrum wide. Ductus bursae long and with irregular row of spicules in distal half. Corpus bursae with single signum.

**Distribution.** Currently only known from the two new species, found in a small area of Mediterranean Spain, provinces of Almería and Granada.

**Etymology.** The generic name *Gielisella* is derived from the family name Gielis, in honour of Cees Gielis, collector of the first specimen. The name is to be regarded as feminine.



***Gielisella clarkeorum* sp. n.**

<http://zoobank.org/AFBC51FB-25D0-4615-9EA4-598553329430>

Figs 1, 3–7, 10, 11, 13, 14, 17, 18, 21–29

**Type material.** **Holotype** ♂, **Spain**, Almería, Enix, 36°52'38.49"N 2°36'24.83"W, 5.iii.2015, coll. nr. 580, leg. PJ & VF Clarke; gen. slide JCK 8361, RMNH.INS.544306 (RMNH).

**Paratypes:** 1♂, 8♀. **Spain**, Almería, same locality as holotype, all leg. PJ & VF Clarke: 1♀, 17.iii.2007, coll. nr. 099, gen. slide Clarke 99 (NHMUK); 1♀, 17.iii.2007, coll. nr. 122, gen. slide Clarke 122 (PGC); 1♂ [moth lost], 17.iii.2008, coll. nr. 171, gen. slide Clarke 171, RMNH.INS.15524 (RMNH); 1♀ [left wings prepared], 17.iii.2008, coll. nr. 166, gen. slide Clarke 166, wing slide JCK 8200 (MNCN); 1♀, 17.iii.2008, coll. nr. 173, gen. slide Clarke 173 (PGC); 1♀ [specimen not spread], 15.ii.2013, coll. nr. 435, gen. slide JCK 8363, RMNH.INS.544295 (RMNH); 1♀ [specimen not spread], 21.iii.2013, coll. nr. 445, RMNH.INS.544296 (PGC); 1♀ [specimen not spread], 18.iii.2014, coll. nr. 544 (PGC). **Spain**, Granada, 1♀, Yator, 22.iv.1978, [leg. C. Gielis]; "Agonoxenidae gen.nov. spec.nov. det J.C.Koster, prep 3850 ♀", "Museum Leiden, ex collectie C. Gielis", "B. hellerella [handwriting Gielis]", RMNH.INS.15525 (RMNH).

**Diagnosis.** *Gielisella clarkeorum* can be separated from *G. nigripalpis* by the pale tipped palpi, and the longitudinal dark streaks on the forewings. In the male genitalia it differs by the two groups of setae on the uncus; by the wide and cylindrical apex of the anellus lobes with a lateral projection near the apex, the more longitudinal shape of the valvae and by the gradual increasing length of the cornuti.

**Description.** Male (Fig. 11). Forewing length 6.7 mm. Head: frons shining white with greyish brown irroration ventrally, vertex, neck tufts and collar shining white, irrorate greyish brown; labial palpus first segment white, second segment white with irrorate greyish brown streak on outside, extending into subapical ventral spot, third segment white with irregular narrow sub-basal ring white and greyish brown tipped scales and similar coloured, broad subapical ring; scape dorsally white, strongly irrorate greyish brown with white anterior line, ventrally greyish white with 8–9 pecten hairs; flagellum shining brownish grey, basal six segments whitish. Thorax and tegulae shining ochreous-white, strongly irrorate greyish brown; thorax with broad dark greyish brown medial line, tegulae broadly lined white posteriorly. Legs: dorsally shining dark greyish brown, ventrally white with some greyish irroration; tibia midleg with white basal and medial streaks and white apical ring, tarsomeres one to four with whitish apical rings; tibia hindleg dorsally pale ochreous-grey, tarsomeres as midleg; spurs midleg and inner spur hindleg whitish, outer spurs hindleg dark brown. Forewing ground colour whitish more or less irrorate by greyish ochreous and greyish brown scales with dark brown and ochreous-yellow streaks in costal half and in apical area, the dark streaks almost fused; in middle of wing at two-fifths, dark brown elongated spot, at costal side connected to streak, edged white; two dark brown tufts of raised scales, first below fold at one-third, second and largest subdorsally at two-thirds, last spot surrounded by white scales, touching streak costally; white spot at apex connected to dark brown spot in apical cilia; several small dark brown spots in costal cilia; two dark brown fringe lines; cilia greyish white. Hindwing shining greyish white; cilia greyish white. Underside: forewing shining brownish grey; hindwing shining greyish white. Abdomen dorsally shining greyish brown, segment seven shining white banded posteriorly; ventrally shining greyish white; anal tuft shining white.

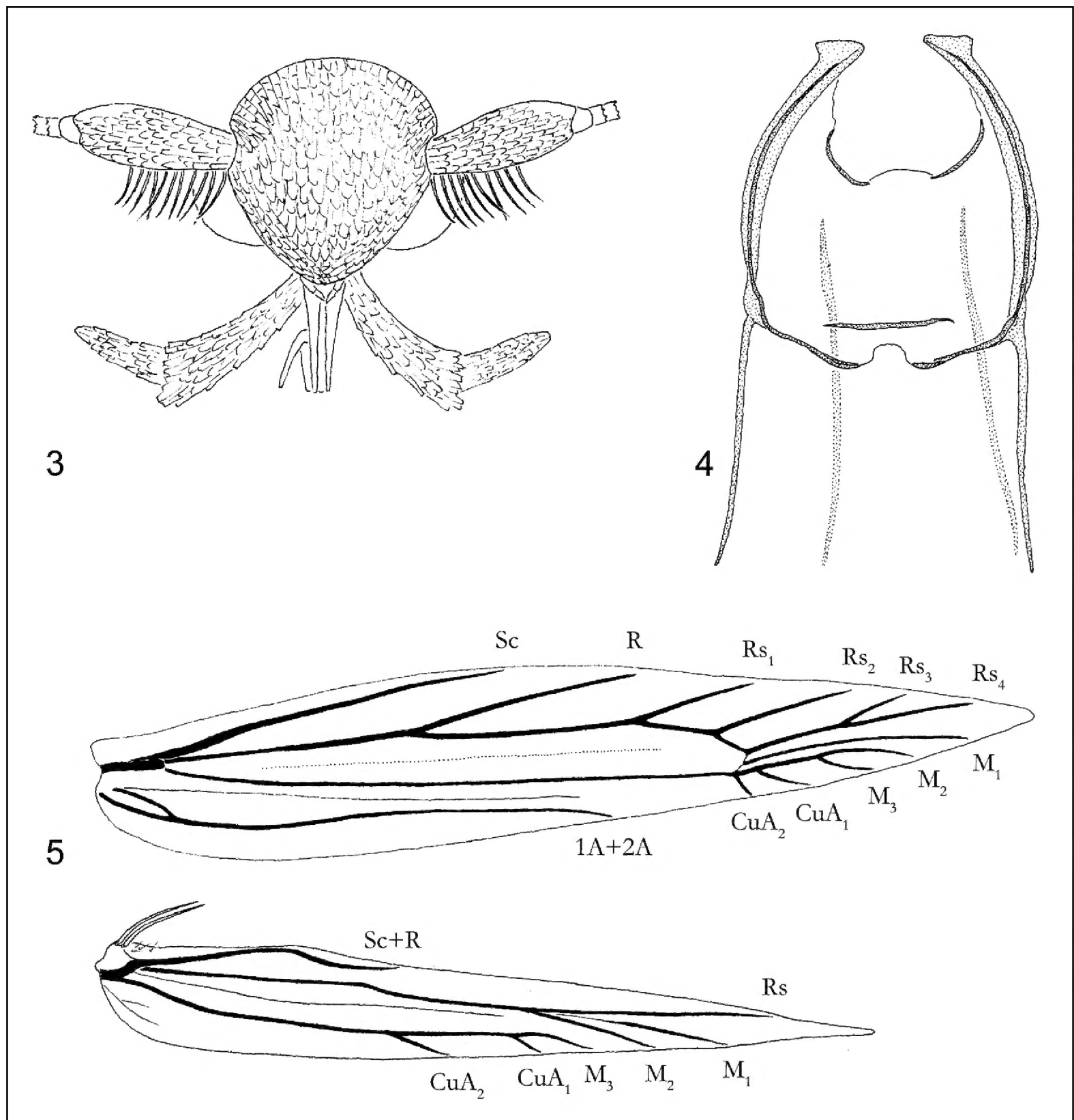




**Figures 1–2.** *Gielisella* species, habitus, watercolours. **1** (top). *G. clarkeorum*, female paratype(s); **2** (bottom). *Gielisella nigripalpis*, male holotype, abdomen reconstructed.

Female (Figs 1, 28). Forewing length 5.1–6.9 mm. femur foreleg apically with white dorsal spot. Forewings with streaks and spots clearly separated, not fused, overall paler than male. Anal tuft ochreous-brown.

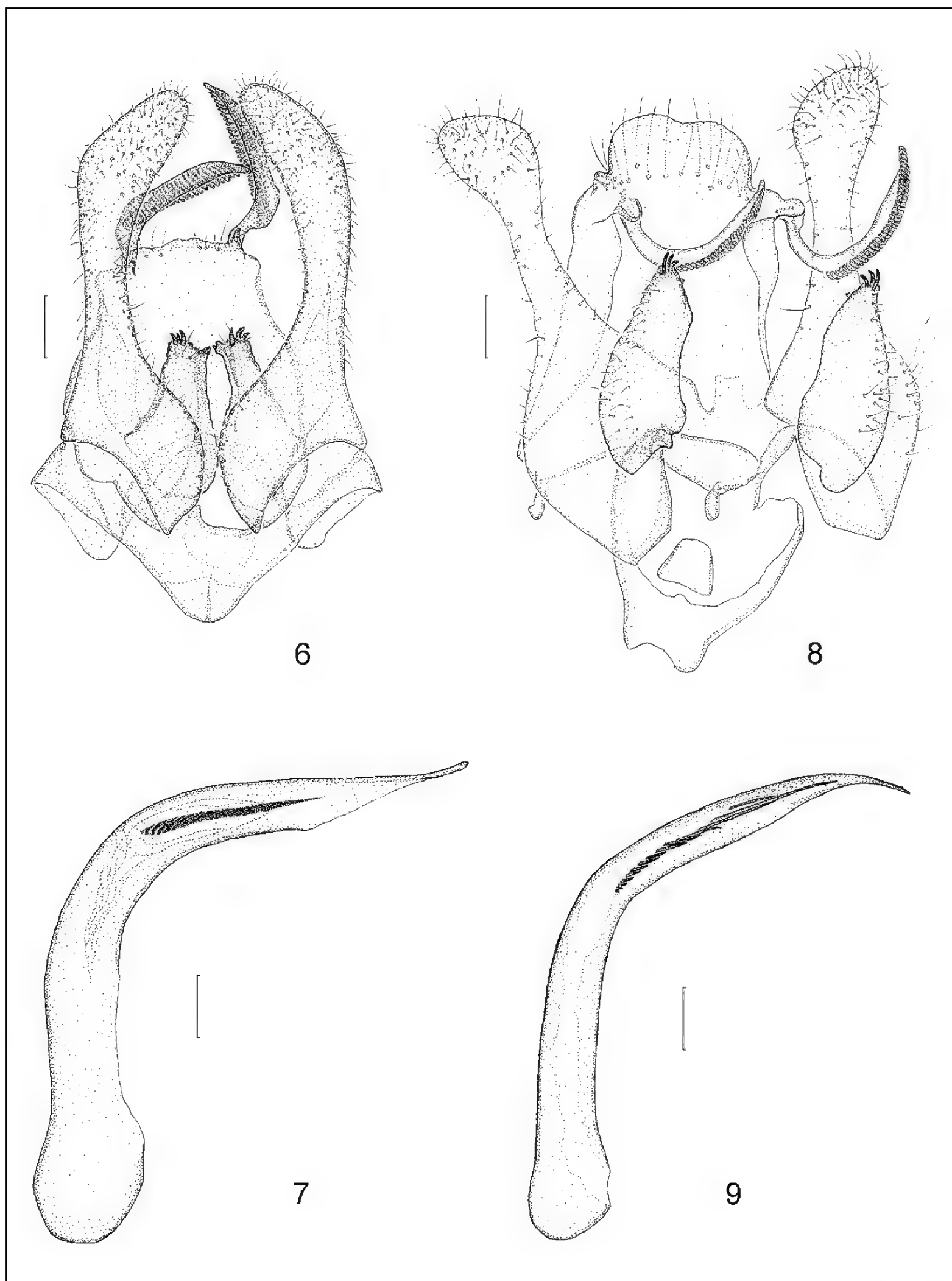
**Male genitalia** (Figs 6, 7, 13, 14, 17, 18). Uncus broad and very short, with 16 setae in two groups. Gnathos arms long and slender, upwards curved at one-third of base, upper side transversely covered with pecten of 32–33 flat peglike setae, about one and half width of gnathos arm (Fig. 14). Tegumen large, longer than wide, slightly narrowing distally. Valvae long, strongly narrowing after one-third, distally slightly widening till 3/4 and slightly narrowing apically with



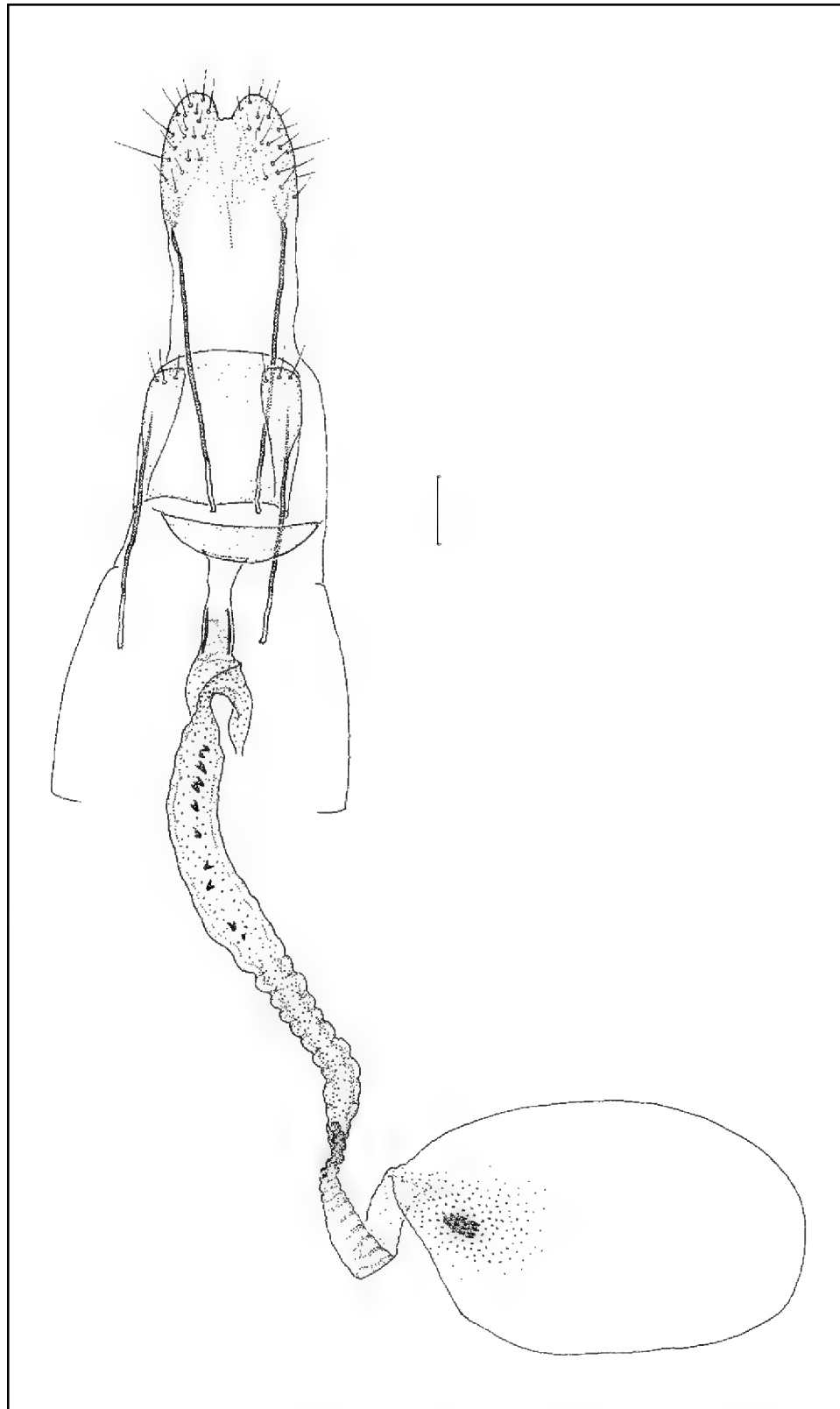
**Figures 3–5.** *Gielisella clarkeorum*, morphological details. **3.** Head, frontal view; **4.** Basal segments of abdomen, genitalia slide Clarke 171; **5.** Wing venation with labelled veins, wing slide JCK 8200.

rounded tip, edges and apex weakly spiny. Anellus lobes large, strongly sclerotized, ventral edge with short spines, strongly tapering distally with distal third more or less cylindrical, apex with three curved teeth and laterally with irregular projection, both combined with several spicules. Vinculum broad with heart-shaped saccus and shield-shaped juxta. Phallus (Figs 7, 17, 18) long, curved ca. 90 degrees, slightly tapering distally, apex pointed, vesica with narrow row of approximately 15 slender cornuti in distal half, cornuti gradually becoming longer towards tip.

Measurements: Length from vinculum to uncus 460  $\mu\text{m}$ , width 435  $\mu\text{m}$ , valva length 560  $\mu\text{m}$ , width 200  $\mu\text{m}$ , phallus length (measured in straight line) 765  $\mu\text{m}$ ; longest cornutus 110  $\mu\text{m}$ .



**Figures 6–9.** *Gielisella* species, male genitalia of holotypes, phallus separately figured. **6, 7.** *G. clarkeorum*, genitalia slide JCK 8361; **8, 9.** *G. nigripalpis*, genitalia slide JCK8362. Scale bars: 0.1 mm.



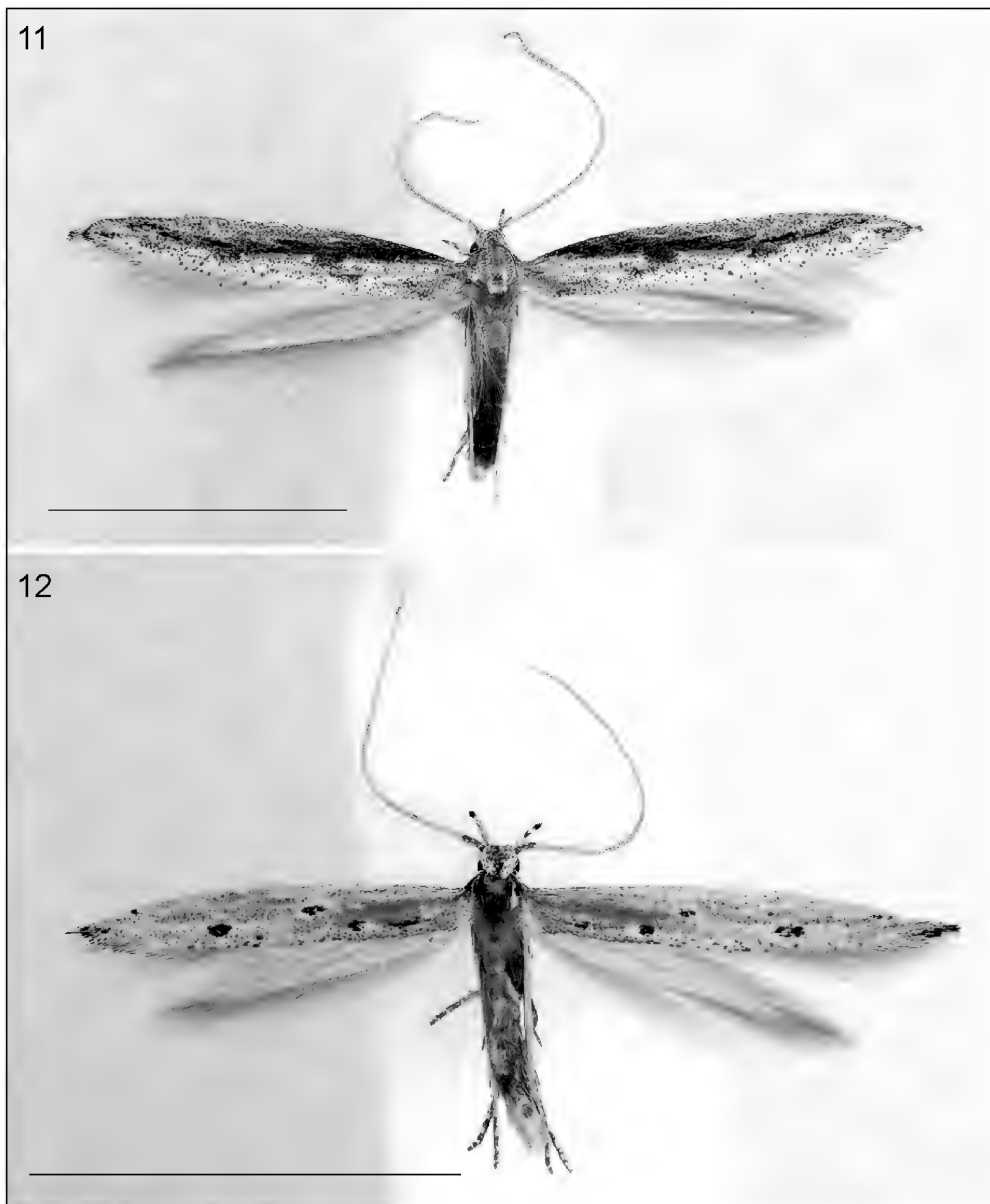
**Figure 10.** *Gielisella clarkeorum*, female genitalia, genitalia slide JCK3850. Scale bar: 0.1 mm.

**Female genitalia** (Figs 10, 21–25). Papillae anales short and rounded. Apophyses anteriores 1/4 shorter than apophyses posteriores. Antrum wide, bowl-shaped. Ductus bursae long, basal half lobed, small section below antrum narrow with partly sclerotized wall, followed by cleavage into ductus bursae and ductus seminalis, distal half of ductus bursae with irregular row of spicules. Corpus bursae egg-shaped, single signum as rectangular field of spines of variable size.

**Distribution** (Fig. 29). Spain, provinces of Almería and Granada. Type locality: 36.8770°N, 2.6036°W. The locality of the specimen from Granada was reconstructed by the collector as either 36.9544°N, 3.1436°W or 36.9528°N, 3.1375°W.

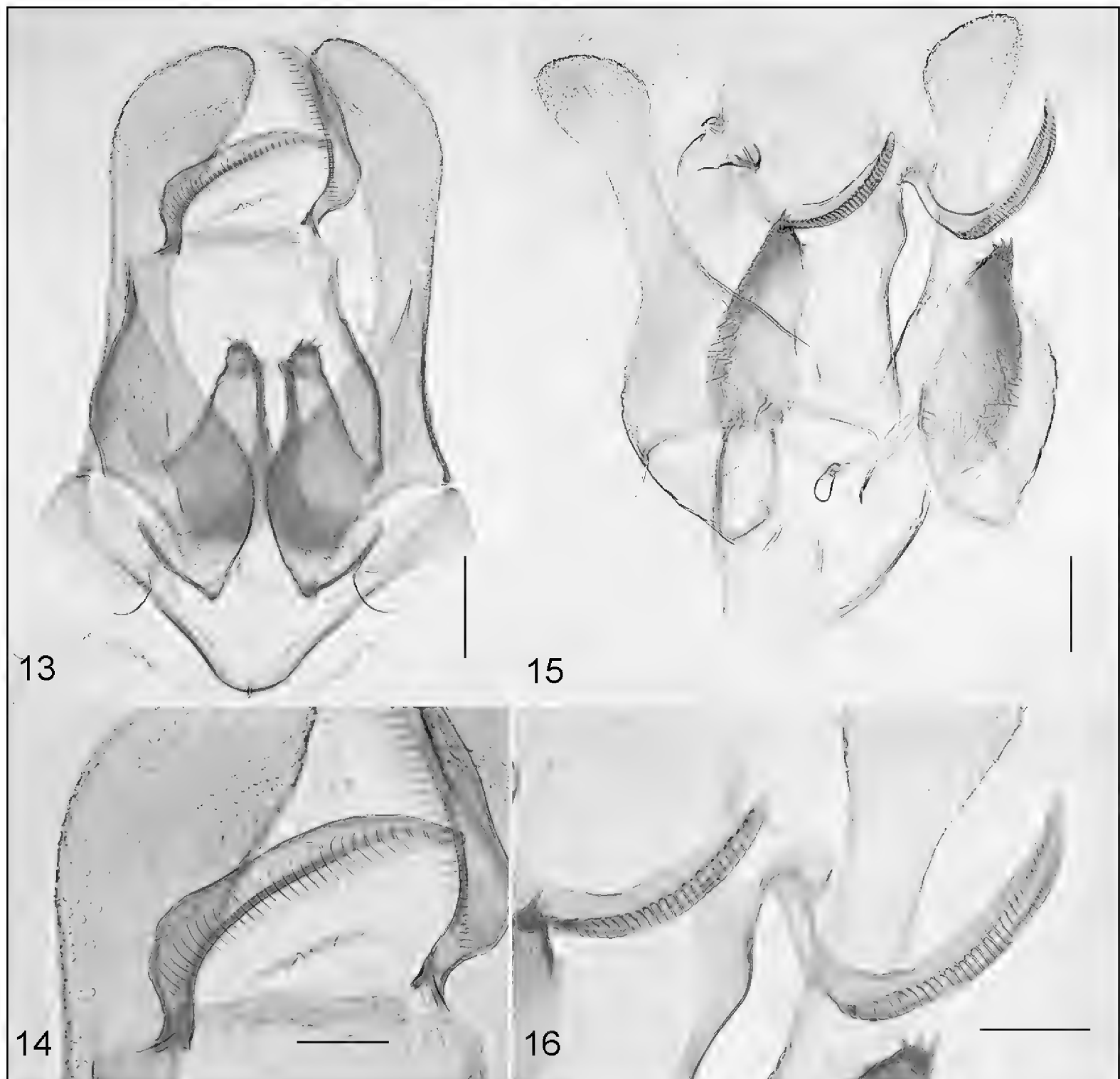
**Biology.** Host-plants and early stages are unknown. The adults have been collected at light from the end of January till late April. The specimen from Granada was collected on a dry northern slope





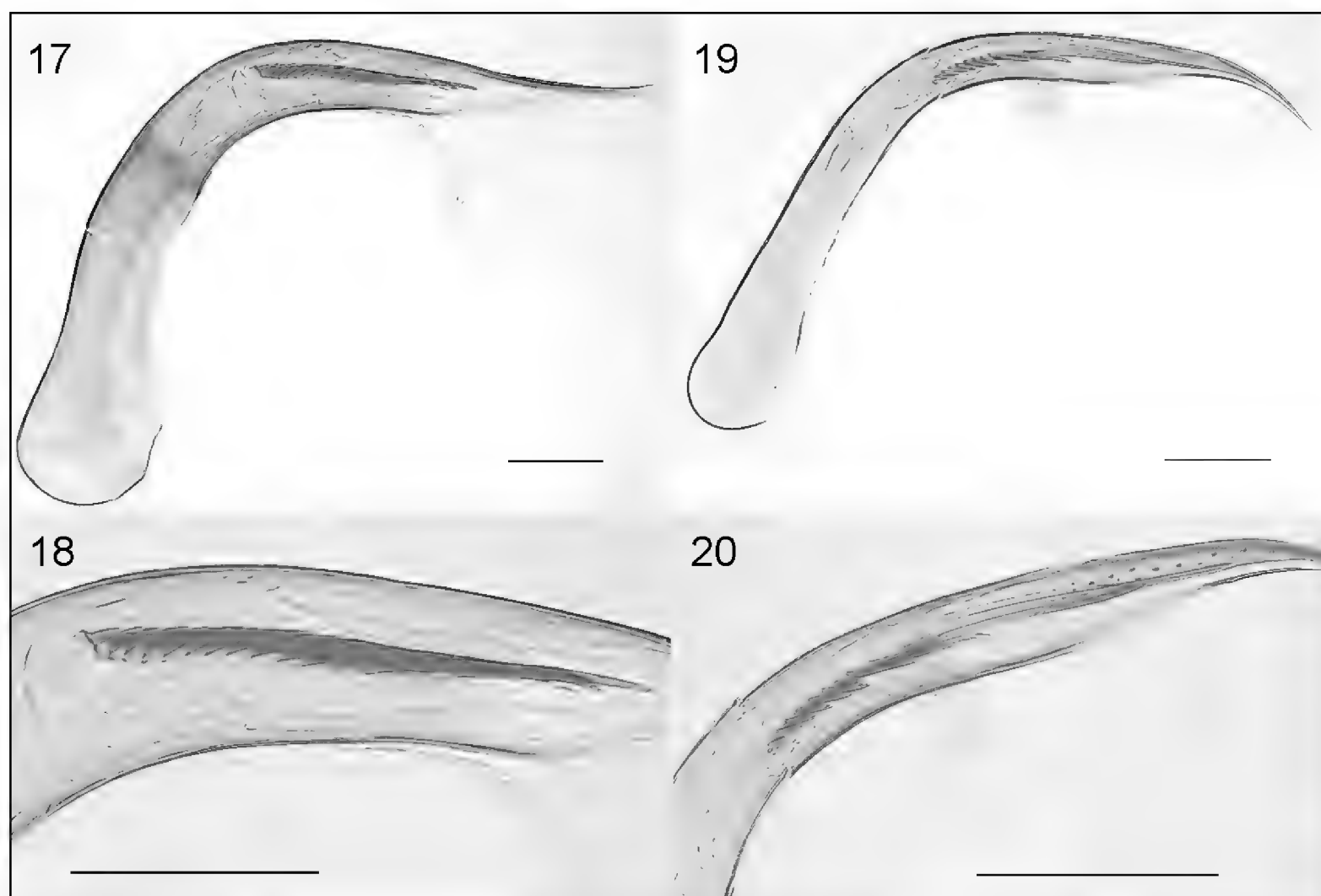
**Figures 11–12.** *Gielisella* species, male holotypes. **11.** *G. clarkeorum*; **12.** *G. nigripalpis*. Scale bars: 5 mm.

of a hill at an elevation of approximately 700 m. The vegetation consisted, among other things, of small shrubs and herbs belonging to Asteraceae, Cistaceae and Poaceae (Gielis, pers. comm.). The specimens from Almería were taken in a garden at the edge of a suburban area on the south facing slope of the Sierra de Gádor at an elevation of 720 m (Figs 26–27). In the garden grow



**Figures 13–16.** *Gielisella* species, male genitalia of holotypes, with gnathos arms enlarged. **13, 14.** *G. clarkeorum*, genitalia slide JCK 8361; **15, 16.** *G. nigripalpis*, genitalia slide JCK8362. Scale bars: 100 µm (13, 15), 50 µm (14, 16).

amongst others the vines and shrubs *Clematis cirrhosa* L. (Ranunculaceae), *Jasminum officinale* L. (Oleaceae), *Rosa* spec. (Rosaceae) and the following trees grow nearby: olive (*Olea europaea* L., Oleaceae), apple (*Malus pumila* Mill., Rosaceae), almond (*Prunus dulcis* (Mill.) D.A. Webb, Rosaceae), silver wattle (*Acacia dealbata* Link, Fabaceae) and at about 50 m from the collecting site a large eucalypt tree (probably *Eucalyptus gomphocephala* A.Cunn. ex DC., Myrtaceae), that was felled in 2015; weeds include *Salsola* sp. (Amaranthaceae) and *Dittrichia viscosa* (L.) Greuter (Asteraceae). The adjacent orchard area has an undergrowth of Poaceae, Juncaceae and *Rubus* sp. (Rosaceae) (Figs 26, 27). According to the collectors, the species started to appear in their garden after they planted the native *Clematis cirrhosa* L., and adults seem to hide in it. This observation requires further study.



**Figures 17–20.** *Gielisella* species, phallus of holotypes, with enlarged detail of cornuti. **17, 18.** *G. clarkeorum*; **19, 20.** *G. nigripalpis*. Scale bars: 100  $\mu$ m.

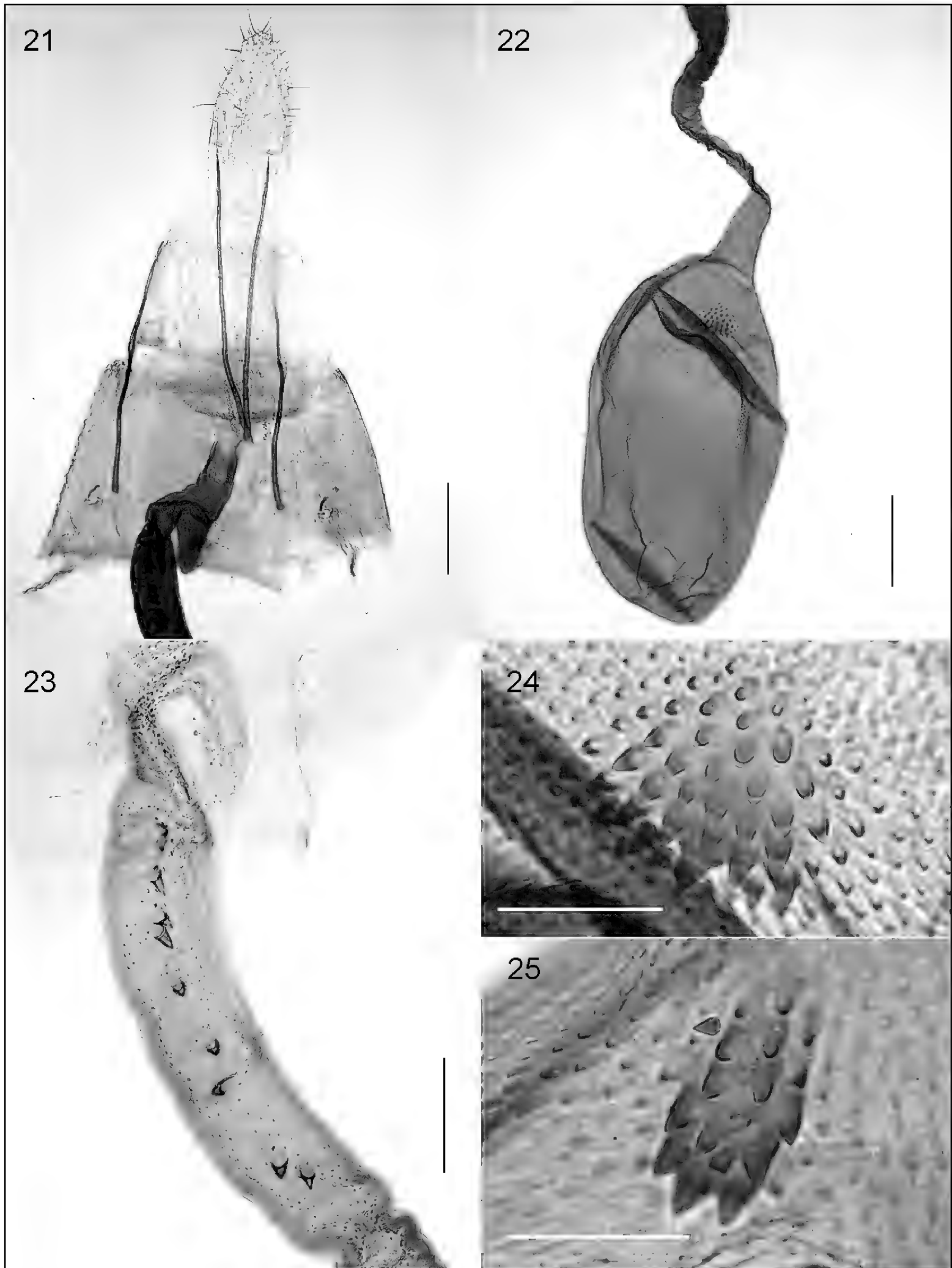
**DNA barcodes.** We barcoded three specimens, including the holotype, resulting in three identical barcodes, with BIN BOLD:ACU7245 (Table 1).

The barcode reads:

AACTTTATATTTTATTTTGGGAATTTGAGCAGGAATAGTAGGAACATCACTTAGTTTATTAATTCGAGCTGAATT-  
AGGAACCCCAGGCTCTTTGATTGGAGATGACCAAATTTATAATACTATTGTCACAGCTCATGCTTTTATTATAAT-  
TTTTTTTATAGTAATACCTATTATAATTGGAGGATTTGGTAACTGATTAGTTCCTTTAATATTAGGAGCCCCCTGATAT-  
AGCATTCCCTCGAATAAACAATATAAGTTTCTGACTTTTACCCCCTTCTATTACTCTTCTAATTTCAAGTAGTATTG-  
TAGAAAATGGAGCTGGAACAGGATGAACGGTTTACCCCCCTTTCATCTAATATTGCTCATAGAGGTAGAT-  
CAGTTGATTTAGCAATCTTTTCTCTTCATTTAGCTGGAATTTCTTCTATTTTAGGAGCTATTAATTTTATCACAACTAT-  
TATTAATATACGTCTAATAAATATATCTTTTGATCAAATACCTTTATTTGTTTGAGCAGTTGGAATTACAGCTTTACT-  
TCTGCTTCTTTCTTTACCTGTTTTAGCTGGAGCTATTACTATGTTATTAACAGATCGTAATCTAAATACTTCATTTTTT-  
GACCCTGCTGGTGGAGGAGACCCAATTCCTTTATCAACATTTATTT

**Etymology.** The specific epithet *clarkeorum*, a noun in genitive plural, is a tribute to the collectors of both species, Peter and Ginny Clarke.

**Remarks.** The forewing of the male holotype is darker than in all females examined, and the pattern elements are more or less fused. Whether this constitutes sexual dimorphism or simple variation can only be decided after collecting more males. We decided to select the male as holotype, since the male genitalia provide the best characters, and only males are known of the next species *G. nigripalpis*.

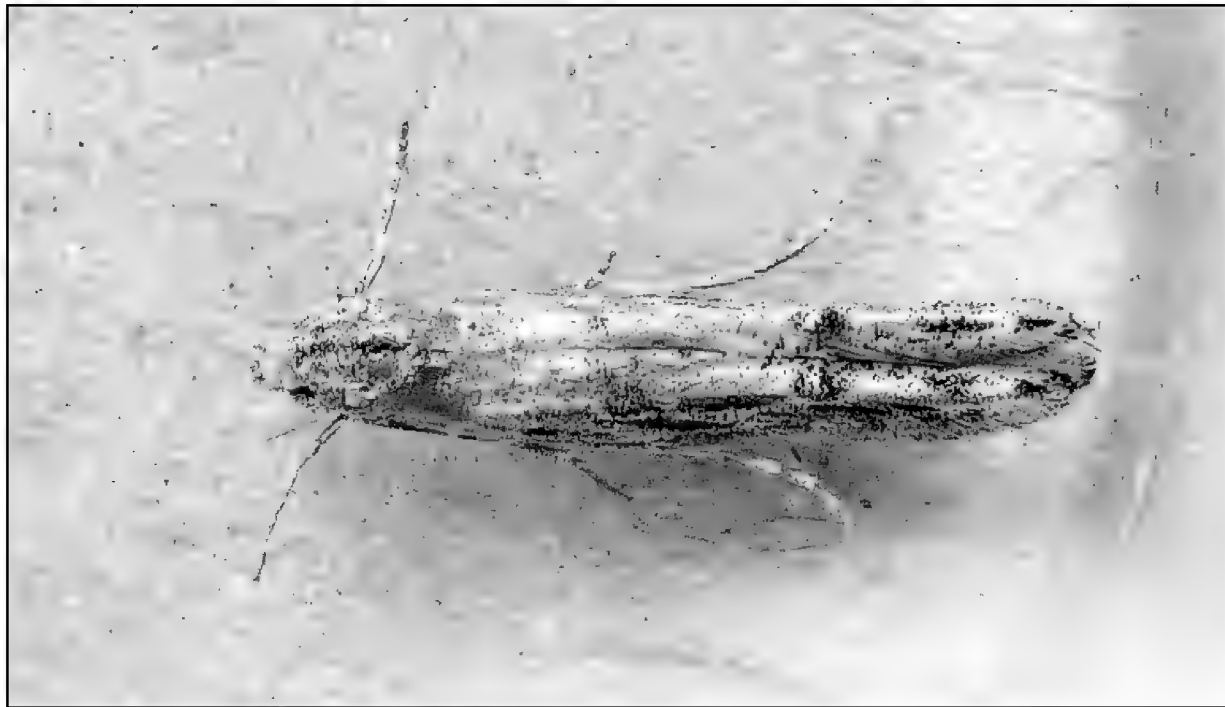


**Figures 21–25.** *Gielisella clarkeorum*, female genitalia, genitalia slides JCK8363 (21, 22, 24) and JCK3850 (23, 25). **21.** Terminal segments with apophyses, antrum, ductus bursae and ductus seminalis; **22.** Ductus and corpus bursae; **23.** Distal half of ductus bursae with spicules. **24, 25.** Variability of signum. Scale bars: 200  $\mu\text{m}$  (21, 22), 100  $\mu\text{m}$  (23), 50  $\mu\text{m}$  (24, 25).





**Figures 26–27.** Type locality of both *Gielisella* species, Enix (Spain, Almería). **26** (top). Garden of the neighbours, next to the collection site, and surrounding mountains; **27** (bottom). Olive and almond orchards on the other side of the road, facing the collecting site. Photos by Marieta Sanjuan Martinez.



**Figure 28.** *Gielisella clarkeorum*, live female, collected on 18.iii.2014, Coll. nr 544. Photo by Peter & Ginny Clarke.

***Gielisella nigripalpis* sp. n.**

<http://zoobank.org/9F713A78-DF7A-4021-986F-5A6BCCE6CCDD>

Figs 2, 8, 9, 12, 15, 16, 19, 20, 26, 27, 29

**Type material.** **Holotype** ♂, **Spain**, Almería, Enix, 36°52'38.49"N 2°36'24.83"W, 7.iii.2015, coll. nr. 587; gen. slide JCK 8362, RMNH.INS.544307 (RMNH). **Paratype** 1♂, same locality as holotype, 30.i.2013, coll. nr. 431 (PGC) [abdomen lost during dissection].

**Diagnosis.** *Gielisella nigripalpis* differs from *G. clarkeorum* by the blackish brown tipped palpi, and the absence of the dark brown longitudinal streaks on the forewings. In the male genitalia it differs by the proportionally placed setae on the uncus; by apically narrowing anellus lobes without lateral projection; the spoon-shaped valvae and by the two very long cornuti at the distal end of the row cornuti.

**Description. Male** (Figs 2, 12). Forewing length 5.2–5.9 mm. Head: frons shining pale grey with greenish and reddish reflections and with greyish brown irroration laterally, vertex and neck tufts shining white, in middle strongly irrorate dark brownish grey, collar shining white, irrorate greyish brown; labial palpus first segment short, white, second segment white, strongly irrorate greyish brown dorsally and laterally on outside, apex white, third segment white with broad, brown basal and blackish brown apical ring, extreme tip white; scape dorsally and ventrally shining brownish grey, pecten with 8–9 hairs; flagellum shining pale ochreous-grey. Thorax shining white, strongly irrorate dark brownish grey in middle and laterally in anterior half. Tegulae shining dark brownish grey, laterally and ventrally lined white. Legs: dorsally shining dark greyish brown, ventrally white with some greyish irroration; tarsomeres one and two of foreleg with white apical rings; tibia midleg with white basal and medial streaks and white apical ring, tarsomeres one to four with whitish apical rings; tibia hindleg dorsally pale ochreous-grey,



**Figure 29.** *Gielisella*: map of localities. Circles: *G. clarkeorum*, triangle: *G. nigripalpis*.

tarsomeres as midleg; spurs midleg and inner spur hindleg whitish, outer spurs hindleg dark brown. Forewing ground colour shining whitish with more or less irrorate by greyish ochreous and greyish brown scales and ochreous streaks; two blackish brown dots with raised scales and three blackish brown streaks, first spot below fold at one-fourth, second spot, larger than first, above fold at two-third, first streak narrow, above dorsum near base, second streak just above middle at one third, third streak at apex; several small dark brown spots in costal cilia; two small dark brown fringe lines; cilia pale ochreous-grey and with dark brown streak at apex. Hindwing shining greyish white with some greenish and reddish gloss; pale ochreous-grey. Underside: forewing shining brownish grey, ochreous-grey in distal half; hindwing shining greyish white. Abdomen not examined.

**Male genitalia** (Figs 8, 9, 14, 15, 19, 20). Uncus as two broad, short and rounded lobes with 16 setae proportional placed across the width. Gnathos arms (Fig. 16) long and slender, upwards bent at one-third of base, upper side transversely covered with pecten of 36 flat peglike setae, about one and half width of gnathos arm. Tegumen large, longer than wide, slightly narrowing distally. Valvae long, strongly narrowing after one-third, distally slightly widening till spoon-shaped apex, edges and apex weakly spined. Anellus lobes large, strongly sclerotized, ventral edge with short spines, strongly tapering distally, apex with three curved teeth, laterally with small triangular tooth. Vinculum broad with heart-shaped saccus and shield-shaped juxta. Phallus (Figs 9, 19, 20) long, curved less than 90 degrees, slightly tapering distally, apex pointed, vesica with narrow row of approximately 13 slender cornuti in distal half of last two cornuti are as long and longer than previous row.

Measurements: Length from vinculum to uncus 590 µm, valva length 525 µm, phallus length (measured in straight line) 655 µm; longest cornutus 125 µm.

**Distribution** (Fig. 29). Spain, province Almería.

**Biology.** Host-plants and early stages are unknown. The specimens were collected at light in the same locality as *G. clarkeorum*, suggesting a similar life history (Figs 26–27). They were found in January and March.

**DNA barcodes.** We barcoded the holotype, with BIN BOLD:ACY4816, at a distance of 7.2% to *G. clarkeorum* (Table 1).

The barcode reads:

AACTTTATATTTTATTTTGGGAATTTGAGCAGGAATAGTAGGTACATCTCTTAGTTTATTAATTCGAGCT-GAACTAGGAACCCCCGGATCTTTAATTGGTGATGATCAAATTTATAATACTATTGTTACAGCTCACGCT-TTTATTATAATTTTTTTTATAGTTATACCTATTATAATTGGAGGATTTGGAAATTGATTAGTTCCTTTAATATTAG-GAGCCCCAGATATAGCTTTCCCCCGAATAAATAATATAAGTTTTTGATTATTACCTCCTTCTCTTACCCTTTTAAT-TTCAAGTAGTATTGTAGAAAATGGAGCTGGGACAGGATGAACGGTTTACCCCCCCTTTCATCTAATATCGCTCAT-AGAGGTAGATCAGTAGATTTAGCAATTTTTCCCTTCATTTAGCTGGAATTTCTTCAATTTTAGGAGCTATTAAT-TTTATTACAAC TATTATTAATATACGATTAATAAATATATCTTTTGATCAAATACCCCTATTTGTTTGAGCAGTTGGGAT-CACAGCTCTTCTTCTTCTTCTTTCCTTACCTGTTTTAGCTGGAGCTATTACTATATTATTAACAGATCGTAATTTAAA-TACCTCATTTTTTGATCCTGCTGGTGGAGGAGACCCTATTTTATACCAACATTTATT

**Etymology.** The epitheton *nigripalpis* is the dative plural of the noun *nigripalpus*, meaning “with black palpi”, referring to the black palpal tip.

## Discussion

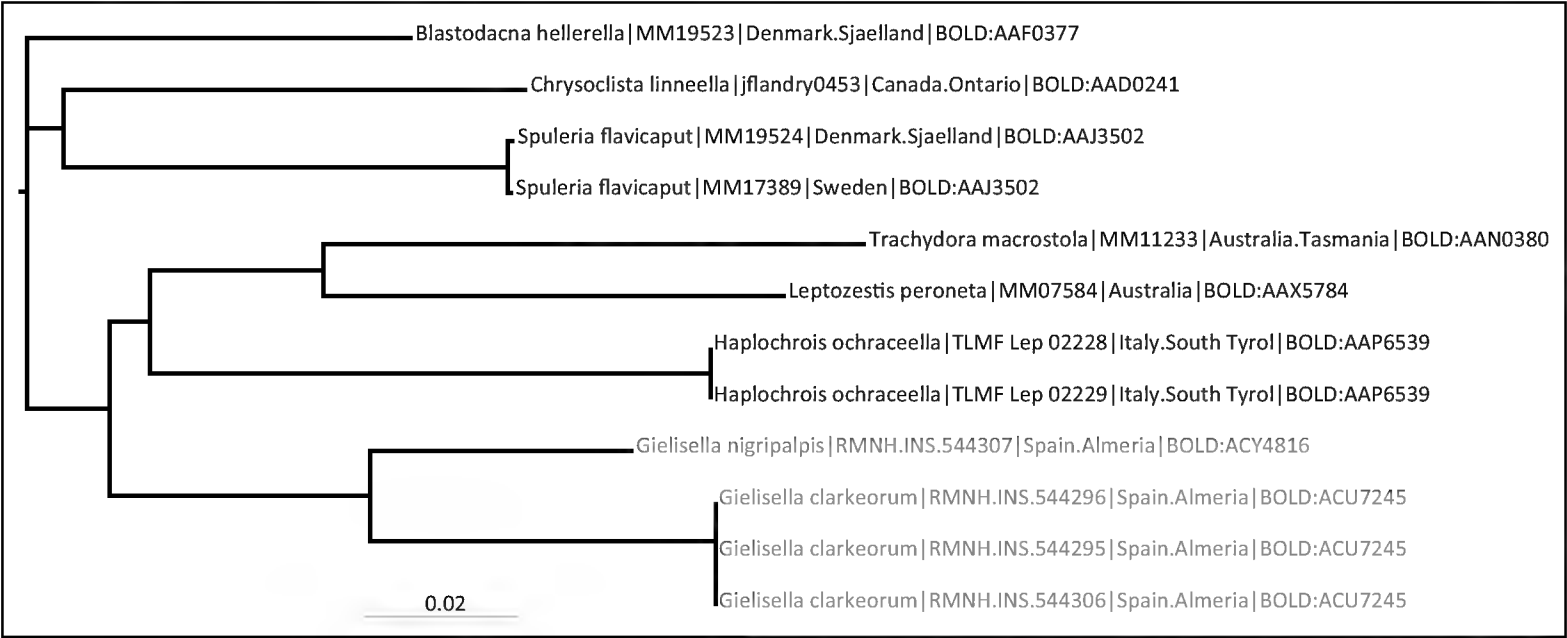
### Justification of the description of a new genus

The new species cannot confidentially be placed in any of the European genera of Parametriotinae. A phylogeny for the family is lacking and for many tropical species the genitalia have never been illustrated. Amongst the other 34 genera listed below we see resemblances, but none sufficient to incorporate these two species. In the narrow shape and features of the forewings the new genus resembles the Neotropical genus *Nanodacna* Clarke, 1964, especially *Nanodacna austrocedrella* Landry & Adamski, 2004 (Landry and Adamski 2004). However, it differs in the third segment of the labial palpus, that is one-half of the length of the second segment, whereas in *Nanodacna* it equals the second segment. In the venation of the forewing it further differs by the wide curve of 1A+2A towards dorsum, in the venation of the hindwing by the in the distal half strongly curved Sc+R1 and the stalked M1 and M2 to Rs. In the male genitalia it differs by the simple valvae, the presence of anellus lobes and by the peculiar shape of the gnathos arms. In the female genitalia it differs by the wide antrum, different ductus bursae and the single signum. This combination of characteristics does not occur at any other genus in the Parametriotinae. The Neotropical genus *Homoeprepes* Clarke, 1962 shows some similarity in the male genitalia with *Gielisella*, but the gnathos arms do not have a single pecten, but are covered with numerous spines (Clarke 1962). The Australian genus *Orthromicta* Meyrick, 1897 resembles *Gielisella* externally.

Considering the very rich Parametriotine fauna of Australia, and the fact that several Australian trees are frequently planted in Spain (eucalypts, wattles), also close to the type locality, made us



consider the possibility of an introduction of an Australian insect. Checking the DNA barcodes of both species in the BOLD database (Ratnasingham and Hebert 2007) did not give any close match, even though a majority of the Lepidoptera species (named and unnamed) present in ANIC have been barcoded (Hebert et al. 2013). In fact, in the total BOLD database, although the two species group together, *Gielisella* barcodes group otherwise with many totally unrelated moths, belonging to several completely different superfamilies, but not with Elachistidae. A quick search in BOLD shows that barcodes are available for 399 specimens of Parametriotinae, representing 99 BIN's (Barcode Identification Number), which represent probably a lower number of species. The majority of these are Australian, particularly belonging to the genera *Leptozestis*, *Trachydora* and *Microcolona*. Several of these are known to feed on *Eucalyptus*. Ted Edwards (ANIC, Canberra) kindly compared photos of our species to the multitude of species in their collection, according to him the “most neglected part” of the collection, but he did not see any match. Genitalia slides of these species are rare, since they have not been revised since their original descriptions. Also David Lees (NHMUK) kindly compared photographs to several Meyrick types in London. Again, nothing matched. Lauri Kaila (Helsinki), who spent some time in Australia, studying Gelechioidea, suggested that such moths as *Gielisella* (considering both appearance and genitalia) do not occur in Australia as far as is known. He dissected quite a few species of *Leptozestis* or *Trachydora* and *Microcolona*, and has not seen genitalia similar to our species. According to him, practically all Australian parametriotines have somewhat curved hindwings (costal margin concave). Kaila considers *Gielisella* to be closest to *Blastodacna*. However, we cannot reconcile the characters of our new species with the current concept of the genus *Blastodacna*, also considering the fact that there are no close DNA barcodes, consider placement in that genus unsatisfactory. Awaiting a more detailed future analysis, we therefore decided to erect a new genus for these two species. For the time we consider the hypothesis that *Gielisella* constitutes a native Palaearctic element as the best working hypothesis. However, it is still possible that we are dealing with imported species, although the import of two congeneric species in the same locality sounds less likely, unless they were transported together with their hostplant.



**Figure 30.** Neighbor Joining tree of DNA barcodes of *Gielisella* and selected other Parametriotinae, with BOLD Sample ID, country and province and Barcode Identification Numbers.

We strongly urge that diverse groups with important life histories, such as these Australian Parametriotinae that may damage *Eucalyptus* trees, should receive a proper taxonomic treatment, so that species can be identified, whether in their natural habitat or as imported species in other parts of the world. Unfortunately the decline of taxonomists has led to a reduction of taxonomic revisions.

## Acknowledgements

We like to express our appreciation to Cees Gielis (Lexmond, The Netherlands) for his co-operation and to Pete and Ginny Clarke (Glasbury on Wye, United Kingdom/Enix, Spain) for the loan and donation of material from Almería. We also thank Martin Corley (Faringdon, United Kingdom) who brought the material of the Clarke collection under our attention. Camiel Doorenweerd (Naturalis Biodiversity Center, Leiden, The Netherlands) is acknowledged for analysing the DNA barcodes. Ted Edwards (ANIC), David Lees (NHMUK), Lauri Kaila (Helsinki, Finland) are acknowledged for checking illustrations of our species against their material and discussing the potential placement. We are grateful to Sergey Sinev (St. Petersburg, Russia), who by arranging the RMNH collection back in the 90's provided a lot of unpublished information on the taxonomy of this group. We thank Robert Hoare (Auckland, New Zealand) for information on *Vanicela* and potential relatives.

Our sincere thanks also go to John Langmaid for linguistic corrections of an earlier version of the manuscript. Marieta Sanjuan Martinez is acknowledged for the photographs of the collecting site in Almería.

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Note: references to authorities of taxon names are given at the end of the appendix.

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## APPENDIX

### Generic catalogue of Parametriotinae

All genera we believe belong to Parametriotinae are listed in alphabetic order. The total number of described species and the number per biogeographic region are given between square brackets after the generic name. In all we count 245 named species in 35 genera, with the largest representation in Australia and New Guinea with 108 species, followed by 44 Palearctic, 41 Neotropical, 27 Oriental, 18 African, 6 Nearctic and 1 Pacific species.

On a second line we provide respectively the type species, original family assignments and later placements. Synonyms are indented.

In order to show some of the diversity we publish here a few water colours and drawings of Eastern Asian and African species, prepared by the senior author, that had not been published before (Figs 31–44).

**Family Elachistidae** Bruand, 1850: 50.

**Subfamily Parametriotinae** Căpuse, 1971: 55.

Type genus *Parametriotes* Kusnezov, 1916: 628, a junior synonym of *Haplochrois* Meyrick, 1897: 310.

Blastodacninae Clarke, 1962: 125. [unavailable]

Type genus *Blastodacna* Wocke, 1876: 428

Sinitineidae Yang, 1977: 261.

Type genus *Sinitinea* Yang, 1977: 262. Synonymized by Park (1986)

***Agalmoscelis*** Diakonoff, 1955: 4. [3, Australian: New Guinea]

Type species *Agalmoscelis resplendens* Diakonoff, 1955, by original designation. Described in Heliodinidae. According to Sinev (unpublished) belonging to Elachistidae-Parametriotinae.

***Araucarivora*** Hodges, 1997: 267. [1, Neotropic]

Type species *Araucarivora gentilii* Hodges, 1997, by original designation. Described in Elachistidae-Agonoxeninae.

***Auxotricha*** Meyrick, 1931: 189. [1, Neotropic]

Type species *Auxotricha ochrogypsa* Meyrick, 1931, by monotypy. Described in Oecophoridae. Placed in Elachistidae-Agonoxeninae-Parametriotini by Hodges (1997).

***Blastodacna*** Wocke in Heinemann & Wocke, [1876] 1877: 428. [14: Palearctic 11, Nearctic 2 + 2 Palearctic, Oriental 1]

Type species *Alucita hellerella* Duponchel, 1838, by subsequent designation by Fletcher, 1928. Described in Lavernidae (syn. of Momphidae). Placed in Cosmopterigidae by Fletcher (1929). Transferred to Blastodacnidae by Clarke (1964).

*Sinitinea* Yang, 1977: 262, synonymized by Park (1986).

Type species *Sinitinea pyrigalla* Yang, 1977, by original designation, described in new family Sinitineidae Yang, 1977, synonymized by Park (1986).

***Chrysoclista*** Stainton, 1854: 225. [14: Palaearctic 7, Nearctic 3 + 1 Palaearctic, Oriental 2, African 1, Australian 1]

Type species *Phalaena linneella* Clerck, 1759, by subsequent designation by Fletcher, 1928. Described in Elachistidae. Placed in Cosmopterigidae by Fletcher (1929). Transferred to Blastodacnidae by Leraut (1980).

*Glyphipteryx* Curtis, 1827: 152, an unjustified emendation of *Glyphipterix* Hübner, [1825]: 421 (Family Glyphipterigidae).

Type species *Phalaena linneella* Clerck, 1759, by original designation. Described in Tineidae. Rejected by International Commission on Zoological Nomenclature (1986).

***Circoxena*** Meyrick, 1916b: 418. [1, Australian]

Type species *Circoxena ditrocha* Meyrick, 1916b, by monotypy. Described in Plutellidae. Placed in Agonoxenidae by Sinev (2002).

***Cladobrostitis*** Meyrick, 1921: 409. [1, Oriental]

Type species *Cladobrostitis melitricha* Meyrick, 1921, by monotypy. Described in Agonoxenidae. Placed in Elachistidae-Agonoxenidae-Blastodacninae by Hodges (1978).

***Colonophora*** Meyrick, 1914a: 280. [2, African]

Type species *Colonophora cateiata* Meyrick, 1914a, by monotypy. Described in Cosmopterigidae. Placed in Blastodacnidae by Clarke (1965).

***Coracistis*** Meyrick, 1897: 370. [1, Australian]

Type species *Coracistis erythrocosma* Meyrick, 1897, by monotypy. Described in Elachistidae. Placed in Heliodinidae by Meyrick (1914d). Placed in Elachistidae-Parametriotinae by Heikkilä et al. (2014).

***Desertidacna*** Sinev, 1988: 17. [1, Palaearctic]

Type species *Desertidacna repetekiella* Sinev, 1988, by original designation. Described in Momphidae s.l. Placed in Agonoxenidae by Riedl (1994).

***Dromiaulis*** Meyrick, 1922: 574. [1, Neotropic]

Type species *Dromiaulis excitata* Meyrick, 1922, by monotypy. Described in Cosmopterigidae. Placed in Agonoxenidae by Sinev (2002).

***Dystebenna*** Spuler in Spuler & Meess, 1910: 386. [1, Palaearctic]

Type species *Elachista stephensi* Stainton, 1849, by monotypy. Described in Elachistidae. Placed in Blastodacnidae by Leraut (1980).

***Gielisella*** Koster & van Nieukerken, 2017: 169. [2, Palaearctic] **gen. n.**

Type species *Gielisella clarkeorum* Koster & van Nieukerken, 2017, by original designation. Described in Elachistidae, Parametriotinae.

***Glaucacna*** Forbes, 1931: 369. [1, Neotropics]

Type species *Glaucacna iridea* Forbes, 1931, by monotypy. Described in Gelechiinae. Transferred to Elachistidae-Agonoxeninae-Parametriotini by Hodges (1997).

***Gnamptonoma*** Meyrick, 1917: 65. [1, Neotropics]

Type species *Gnamptonoma leptura* Meyrick, 1917, by monotypy. Described in Heliodinidae. Transferred to Agonoxeninae by Becker (1999) on the basis of the external similarity of *Haplochois*. Status uncertain.

***Haplochois*** Meyrick, 1897: 299. [30: Palaearctic 11, Nearctic 1, Neotropic 13, Oriental 2, African 2, Australian 5]

Type species *Haplochois chlorometalella* Meyrick, 1897 by original designation. Described in Elachistidae. Placed in Agonoxenidae by Sinev (1999). Senior synonym of type genus *Parametriotes*.

*Aetia* Chambers, 1880: 186, a junior homonym of *Aetia* Agassiz, 1847: 27 [Bryozoa].

Type species *Aetia bipunctella* Chambers, 1880, by monotypy. Described in Tineina. Synonymized by Sinev (1999) [no objective replacement name known].

*Rhadinastis* Meyrick, 1897:299.

Type species *Rhadinastis microlychna* Meyrick, 1897, by original designation. Described in Elachistidae. Synonymized by Sinev (1999)

*Tetanocentria* Rebel, 1902: 107.

Type species *Tetanocentria gelechiella* Rebel, 1902, by monotypy. Described in Elachistidae. Synonymized by Sinev (1999)

*Platybathra* Meyrick, 1911: 78.

Type species *Platybathra ganota* Meyrick, 1911, by monotypy. Described in Plutellidae. Synonymized by Sinev (1999)

*Parametriotes* Kusnezov, 1916:628.

Type species *Parametriotes theae* Kusnezov, 1916, by original designation. Described in Tineidae. Synonymized by Sinev (1999)

*Syntetrernis* Meyrick, 1922:574.

Type species *Syntetrernis xiphodes*, Meyrick 1922, by original designation. Described in Cosmopterigidae. Synonymized by Sinev (1999)

*Chaetocampa* Busck in Bottimer, 1926: 804. Type species *Chaetocampa crotonella* Bottimer, 1926, by original designation. Described in Cosmopterigidae. Synonymized with *Aetia* by Hodges, 1962.

*Panclintis* Meyrick, 1929: 511.

Type species *Panclintus socia* Meyrick, 1929, by monotypy. Described in Cosmopterigidae. Synonymized by Sinev (1999)

*Prochola* auct. [partim, misapplied, not the type species, see below]. See Hodges (1997).

***Heinemannia*** Wocke in Heinemann & Wocke, [1876] 1877:428. [3, Palaearctic]

Type species *Tinea laspeyrella* Hübner, 1796, by subsequent designation by Fletcher, 1929. Described in Lavernidae. Placed in Cosmopterigidae by Fletcher (1929). Transferred to Agonoxenidae-Blastodacninae by Hodges (1978).

*Tebenna* Hübner, 1825: 414, a junior homonym of *Tebenna* Billberg, 1820: 90.

Type species *Tinea festivella* Denis & Schiffermüller, 1775, by subsequent designation by Fletcher, 1929. Synonymized by Leraut (1980).

***Helcanthica*** Meyrick, 1932: 315. [1, Neotropics]

Type species *Helcanthica spermotoca* Meyrick, 1932, by monotypy. Described in Cosmopterigidae. Placed in Agonoxenidae by Becker (1984b).

***Homoeoprepes*** Walsingham, 1909: 10. [3, Neotropic]

Type species *Homoeoprepes trochiloides* Walsingham, 1909, by original designation. Described in Lavernidae. Placed in Blastodacnidae by Clarke (1962). Placed in Agonoxenidae by Becker (1984b).

***Ischnopsis*** Walsingham, 1881: 236. [4, African]

Type species *Ischnopsis angustella* Walsingham, 1881, by monotypy. Described in Tineidae. Transferred to Agonoxenidae by Sinev (2004).

*Iriothyrsa* Meyrick, 1908: 736.

Type species *Iriothyrsa melanogma* Meyrick, 1908, by monotypy. Described in Plutellidae. Synonymized by Sinev (2004).

*Amblyxena* Meyrick, 1914c: 207.

Type species *Amblyxena enopias* Meyrick, 1914c, by monotypy. Described in Coleophoridae. Synonymized by Sinev (2004).

***Leptozestis*** Meyrick, 1924: 91. [34: Neotropic 1, Oriental 2, Australian 31]

Type species *Syntomactis parascia* Meyrick, 1897, by original designation. Described in Cosmopterigidae. Placed in Elachistidae-Parametriotinae by Kaila et al. (2011).

*Pogonias* Lower, 1893 a junior homonym of *Pogonias* Lacépède, 1802.

Type species *Pogonias euryplaca* Lower, 1893, by monotypy. Synonymized by Meyrick (1897).

Meyrick (1924) proposed *Leptozestis* for the Australian species previously placed in *Syntomactis* Meyrick, 1889: 173. *Syntomactis* was established for *Gelechia deamatella* Walker, 1864 from New Zealand and placed in Elachistidae (Meyrick, 1889). Meyrick (1924) came to the conclusion that this species belongs to *Pyroderces* Herrich-Schäffer 1853: 47. (Cosmopterigidae), thus synonymizing the two genera. For the Australian species in *Syntomactis* he erected *Leptozestis* with *L. parascia* (Meyrick, 1897) as type species. In the BOLD database many unnamed species are listed as *Leptozestis* spec.

***Licmocera*** Walsingham, 1891: 128. [1, African]

Type species *Licmocera lyonetiella* Walsingham, 1891, by original description. Described in Tineidae. Placed in Heliodinidae by Meyrick (1913c). Transferred to Schreckensteiniidae by Fletcher (1929). Transferred to the Momphidae-*Blastodacna*-complex by Kasy (1976). Status uncertain. Probably belonging to Roeslerstammiidae (Hoare, pers. comm.).



***Microcolona*** Meyrick, 1897: 370. [33: Palaearctic 1, Neotropic 1, Oriental 12, African 2, Australian 16, Pacific 1] Figs 31, 34–38.

Type species *Microcolona characta* Meyrick, 1897, by original designation. Described in Elachistidae. Placed in Momphidae-Blastodacninae by Sinev (1988). Transferred to Agonoxenidae by Riedl (1994).

*Aganoptila* Meyrick, 1915: 333.

Type species *Aganoptila phanarcha* Meyrick, 1915, by monotypy. Described in Cosmopterigidae. Synonymized by Sinev (2002).

*Griphocosma* Fletcher, 1929: 101.

Type species *Microcolona citroplecta* Meyrick, 1917, by monotypy. Described in Cosmopterigidae. The authorship of *Griphocosma* was attributed to “Meyrick MS.” by Fletcher (1929).

***Nanodacna*** Clarke, 1964: 125. [5, Neotropics]

Type species *Nanodacna ancora* Clarke, 1964, by original designation.

Described in Blastodacnidae. Placed in Agonoxenidae by Nye & Fletcher (1991). Transferred to Elachistidae-Agonoxeninae-Parametriotini by Hodges (1997).

***Nasamonica*** Meyrick, 1922: 555. [1, African] Figs 33, 39–40

Type species *Nasamonica oxymorpha* Meyrick, 1922, by monotypy. Described in Coleophoridae. Placed in Momphidae by Baldizzone (1979), but Kasy (in Baldizzone 1979), after studying the genitalia, placed it in Momphidae-Blastodacninae. [the illustrated species is undescribed]

***Orthromicta*** Meyrick, 1897: 401. [3, Australian]

Type species *Orthromicta galactitis* Meyrick, 1897, by monotypy. Described in Elachistidae. Placed in Cosmopterigidae-Chrysopeleinae by Nielsen (1996). Transferred to Agonoxenidae by Sinev (2002).

***Pammeces*** Zeller, 1863: 152. [5, Neotropic]

Type species *Pammeces albivitella* Zeller, 1863, by monotypy.

Described in Elachistidae. Placed in Elachistidae-Agonoxeninae-Parametriotini by Hodges (1997).

Hodges (1997) mentioned five species of this genus, but did not check the material. Becker (1999) added an additional species, but the drawing of the male genitalia does not resemble those of Parametriotinae. This species does not match the extensive description of the genus by Zeller (1863). The forewings are not sharply pointed and the antennae are too short. It is therefore not included here.

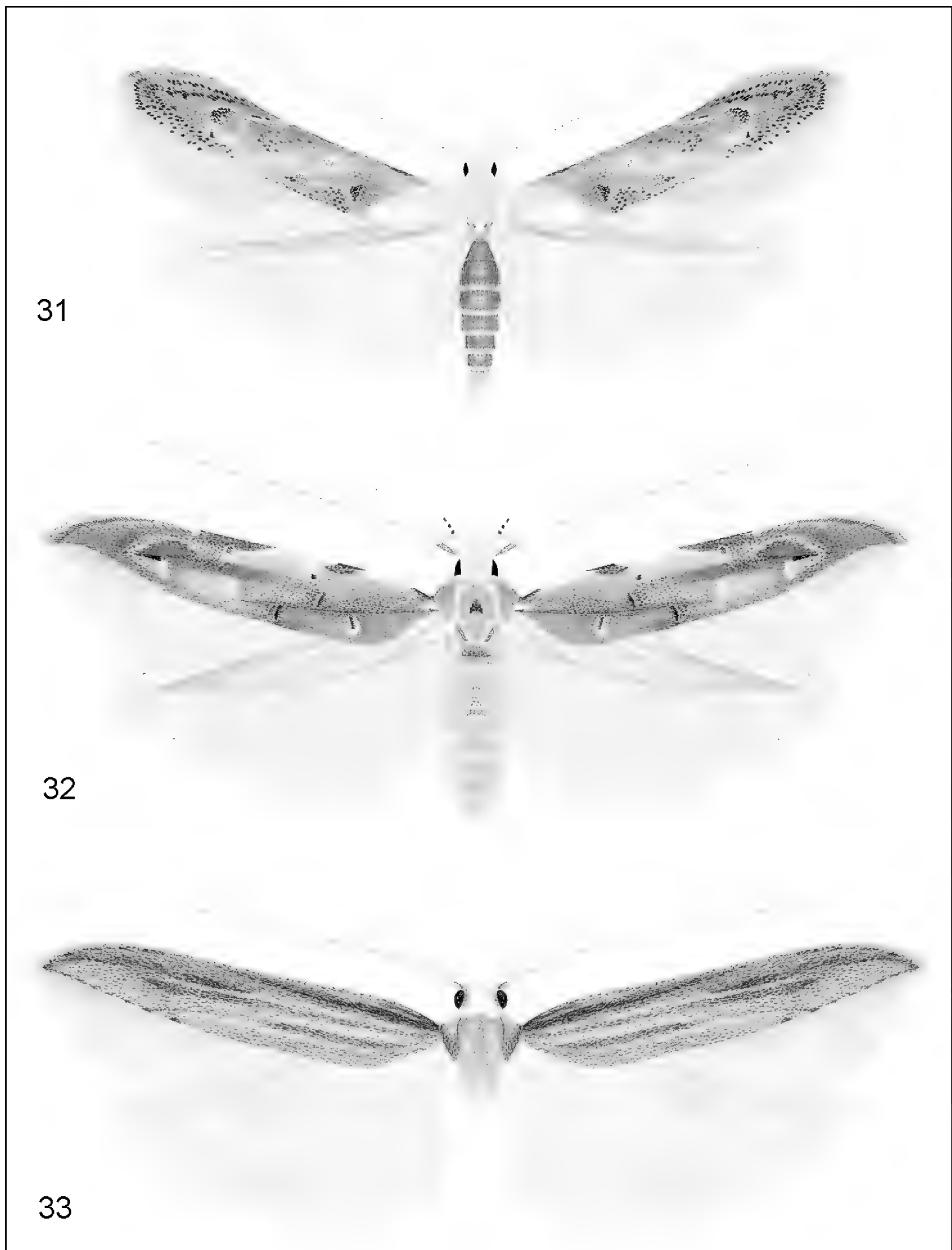
*Psammeces* Walker, 1866: 1843. An incorrect subsequent spelling of *Pammeces* Zeller, 1863.

***Patanotis*** Meyrick, 1913b: 80. [2, Oriental]

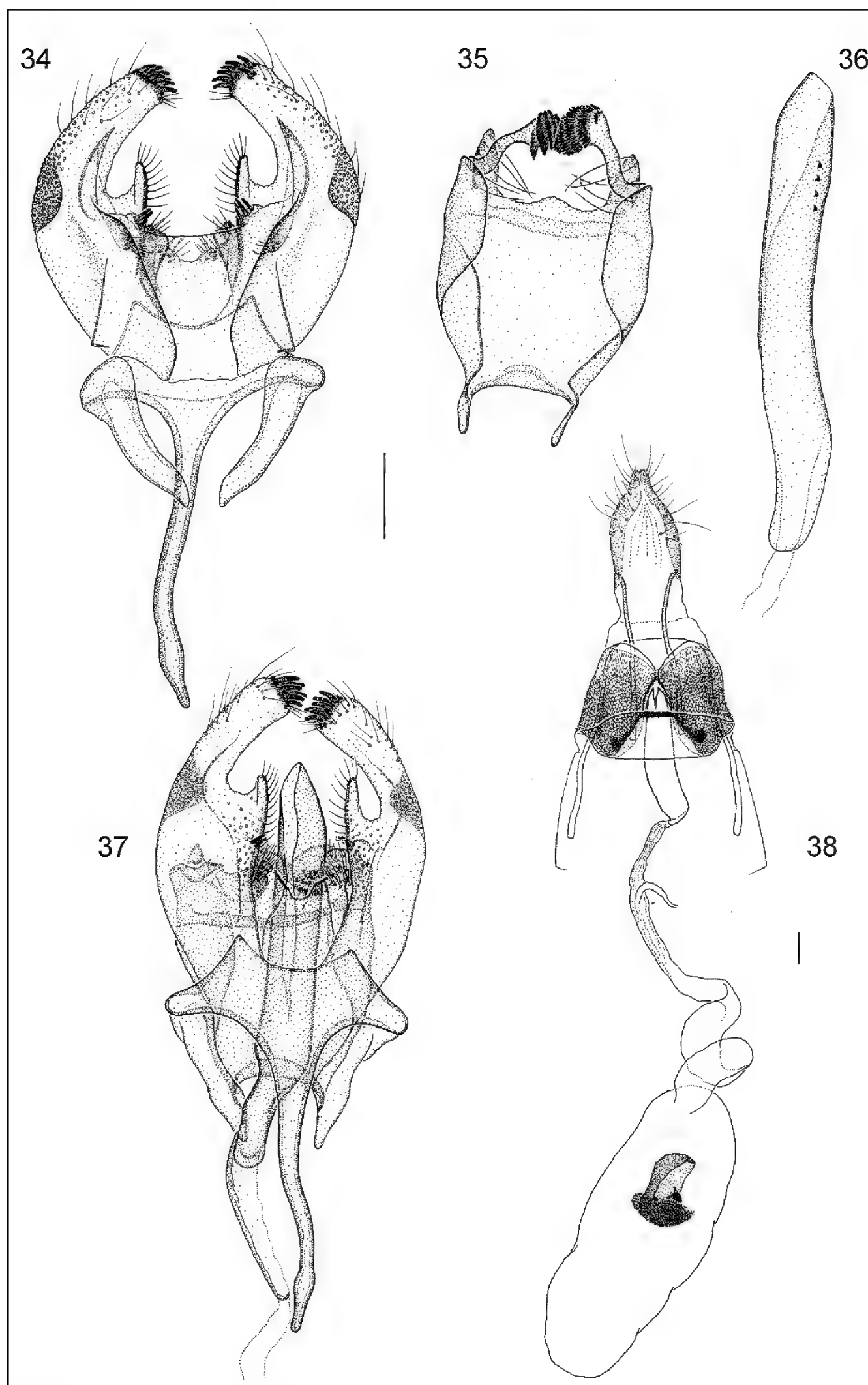
Type species *Patanotis harmosta* Meyrick, 1913b, by original designation. Described in Heliodontidae. Placed in the Momphidae-Blastodacna-complex by Kasy (1976). Status uncertain. Probably belonging to Roeslerstammiidae (Hoare, pers. comm.).

***Pauroptila*** Meyrick, 1913a: 309. [1, African]

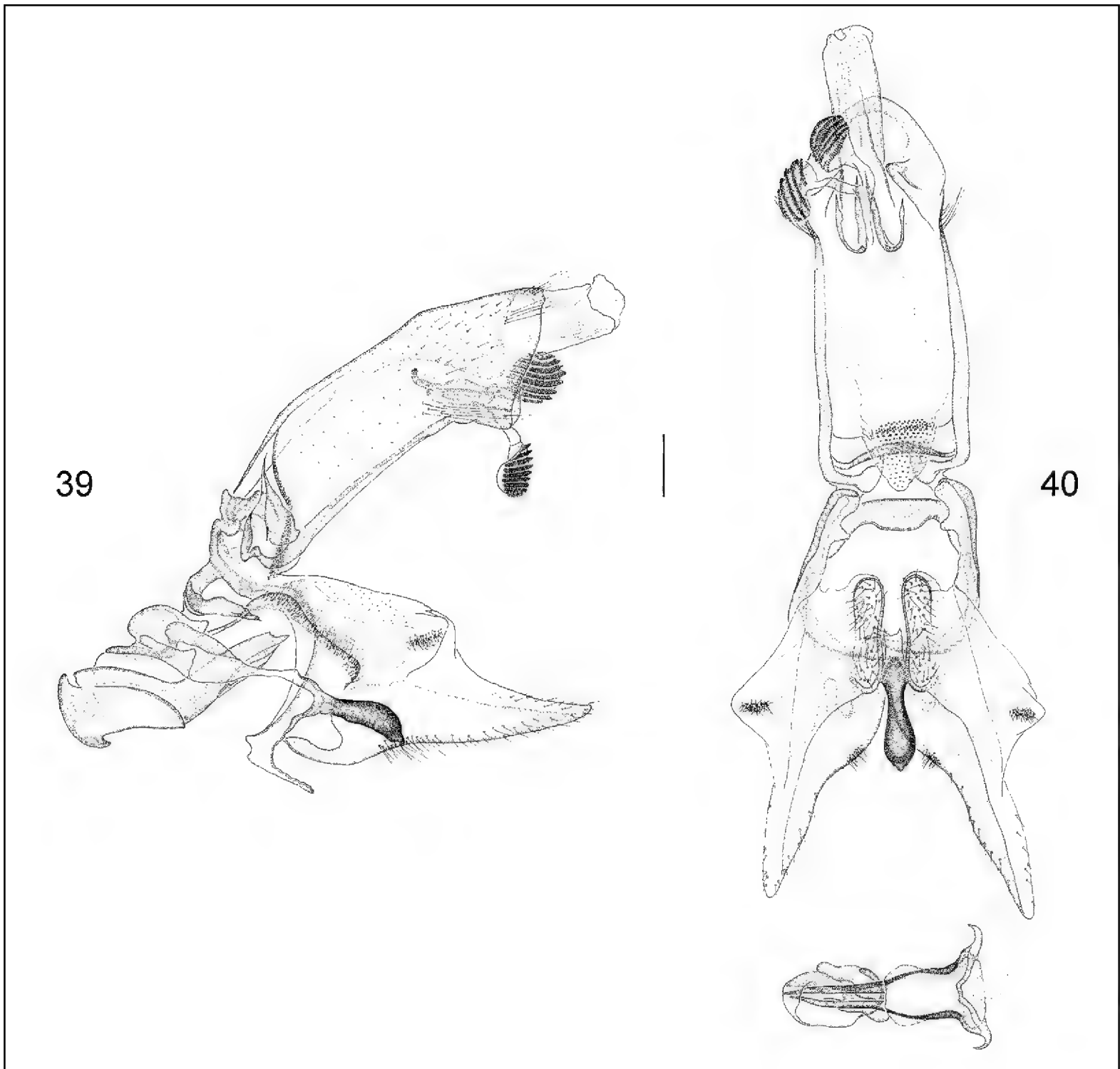
Type species *Pauroptila galenitis* Meyrick, 1913a, by monotypy. Described in Momphidae. Meyrick (1913a) mentioned in his description of the genus that it is related to *Microcolona*. Later authors (Janse 1917, Vári et al. 2002) placed the genus in Cosmopterigidae. Placed in Agonoxenidae by



**Figures 31–33.** Examples of adult Elachistidae-Parametriotinae species. **31** (top). *Microcolona aurantiella* Sinev, 1988, paratype male, Russia, Primorsky Krai, Khasan district, 3 km SE Andreevka, 21.vii–16.viii.1985, Sinev (ZIAN); forewing length 5.2 mm; **32** (middle). *Trachydora ussuriella* Sinev, 1981, paratype male, Russia, Primorsky Krai [Ussurian region], Spasskiy District, Yakovlevka, 13.vii–10.viii.1926, Dyakonov & Filipyev (ZIAN); forewing length 5.8 mm; **33** (bottom). Undescribed South African species of *Nasamonica*, male, Republic of South Africa, Sarnia, xi.[19]13, leg. Mrs. Gurry, coll. Janse (TMSA), forewing length 9.2 mm. Figs 31 and 32 at same scale.



**Figures 34–38.** *Microcolona aurantiella*. Male and female genitalia, genitalia in vials, data as Fig. 31. **34.** Valvae, vinculum and saccus; **35.** Tegumen, uncus and gnathos arms; **36.** Phallus; **37.** Male genitalia *in situ*, same as Figs 34–36; **38.** Female genitalia. Scale bars: 0.1 mm



**Figures 39–40.** Undescribed species of *Nasamonica*, male genitalia, genitalia slide Wf 5765, data as Fig. 33. **39.** Lateral view, phallus *in situ*; **40.** Ventral view, phallus *ex situ*. Scale bar: 0.2 mm.

Sinev (2002). A second species, *P. skikoraella* Viette, 1958 from Madagascar does not belong to Elachistidae-Parametriotinae judging from the genitalia drawings.

***Phalaritica*** Meyrick, 1913b: 82. [1, Oriental]

Type species *Phalaritica vindex* Meyrick, 1913b, by monotypy. Described in Heliodinidae. Placed in the Momphidae-*Blastodacna*-complex by Kasy (1976). Status uncertain. Probably belonging to Roeslerstammiidae (Hoare, pers. comm.).

***Phepsalostoma*** Meyrick, 1936: 626. [1, Oriental]

An objective replacement name for *Asterostoma* Meyrick, 1935b. Described in Cosmopterigidae. Placed in Agonoxenidae by Sinev (2002).



*Asterostoma* Meyrick, 1935b: 607, a junior homonym of *Asterostoma* Agassiz in Agassiz & Desor 1847.

Type species *Asterostoma electracma* Meyrick, 1935b, by monotypy. Described in Cosmopterigidae.

***Spuleria*** Hofmann, 1898: 230. [3, Palearctic]

Type species *Tinea aurifrontella* Geyer in Hübner, [1832], by monotypy. Described in Tineidae. Placed in Elachistidae by Stainton (1854). Placed in Cosmopterigidae by Fletcher (1929). Transferred to Agonoxenidae-Blastodacninae by Hodges (1978).

***Tocasta*** Busck, 1912: 4. [3, Neotropic]

Type species *Tocasta priscella* Busck, 1912, by original designation. Described in Coleophoridae. Placed in Tineidae by Fletcher (1929). Placed in Coleophoridae by Becker (1984b). Transferred to Elachistidae-Agonoxeninae by Baldizzone (1989).

*Amblytenes* Meyrick, 1930: 229.

Type species *Amblytenes lunatica* Meyrick, 1930, by monotypy. Described in Cosmopterigidae. Placed in Coleophoridae-Batrachedrinae by Becker (1984b). Transferred to Agonoxenidae-Parametriotini and synonymized by Hodges (1997).

*Diacholotis* Meyrick, 1937: 79.

Type species *Diacholotis iopyrrha* Meyrick, 1937, by monotypy. Described in Cosmopterigidae. Placed in Agonoxenidae by Becker (1984b). Synonymized by Becker (1999).

The genus belongs to Parametriotinae according also to Hodges (1997) and Becker (1999). Becker (1999) resurrected *Amblytenes* Meyrick, 1930 as a good genus on the basis of differences in the male genitalia. In our opinion these differences are insufficient to support separate genera and we follow Hodges' synonymy.

***Trachydora*** Meyrick, 1897: 390. [50: Australian 42, Palearctic 4, Oriental 1, African 3] Figs 32, 41–44

Type species *Trachydora illustris* Meyrick, 1897, by original designation. Described in Elachistidae. Placed in Momphidae-Blastodacninae by Sinev (1982). Transferred to Cosmopterigidae-Chrysopeliinae by Nielsen (1996). Placed in Elachistidae-Parametriotinae by Kaila et al. (2011).

*Anataractis* Meyrick, 1916a: 565.

Type species *Anatarctis plumigera* Meyrick, 1916a, by monotypy. Described in Cosmopterigidae. Synonymized by Fletcher (1929).

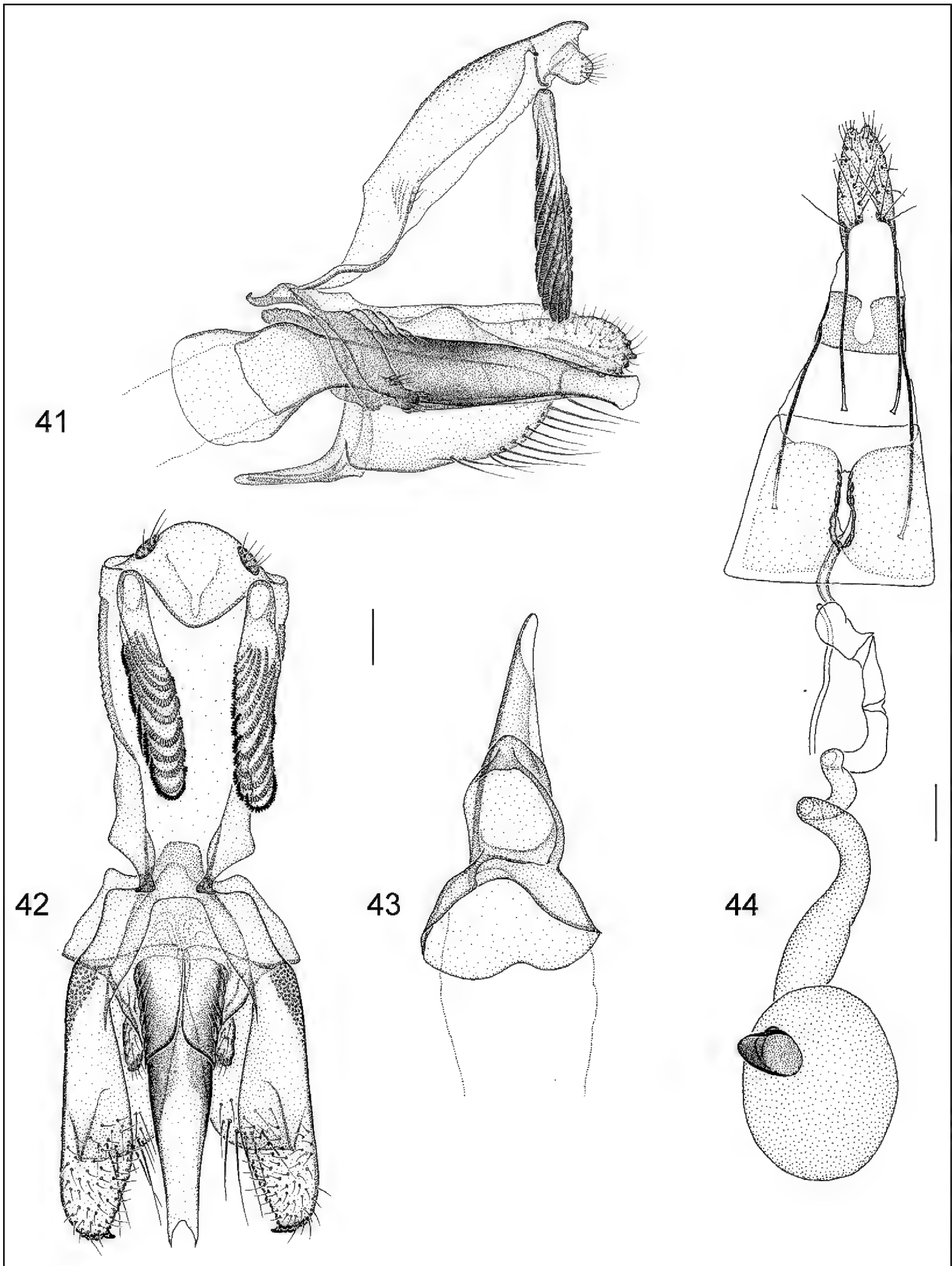
*Balionebris* Meyrick, 1935a: 573.

Type species *Balionebris bacteriota* Meyrick, 1935a, by monotypy. Described in Cosmopterigidae. Synonymized by Sinev (2002)

*Sindicola* Amsel, 1968: 22.

Type species *Sindicola squamella* Amsel, 1968, by original designation. Described in Cosmopterigidae. Synonymized by Kasy (1969).

Meyrick described this genus from Australia with 22 species. An additional 20 species were added by later authors. The genus shows external similarity with *Leptozestis*; detailed taxonomic revisions are required to establish whether these two genera are separate or not.



**Figures 41–44.** *Trachydora ussuriella*. Male and female genitalia, genitalia in vials, phallus *ex situ*, data as Fig. 32. 41. Lateral view; 42. Ventral view; 43. Phallus in ventral view; 44. Female genitalia. Scale bars: 0.2 mm.

***Zaratha*** Walker, 1864: 789. [13: Neotropic 4, Oriental 2, African 1, Australian 5]

Type species *Zaratha pterodactylella* Walker, 1864, by monotypy. Described in Lepidoptera-Heterocera. Placed in Agonoxenidae-Blastodacninae by Becker (1984a).

The genus has been described from Mexico. Becker (1984a) gives illustrations of the male genitalia of two species which clearly belong to Parametriotinae. Specimens identified as belonging to *Zaratha* from outside the New World have to be checked to see whether they actually belong to this genus.

### Genera excluded from Parametriotinae

***Lamprystica*** Meyrick, 1914b: 58.

Type species *Lamprystica purpurata* Meyrick, 1914b, by monotypy. Described in Glyphipterigidae. Placed in Oecophoridae (Stathmopodini) by Heppner (1981); in Oecophoridae (Depressariinae) by Kameda, 1988. The tribus Stathmopodini and the subfamily Depressariinae were later raised to separate families (Minet, 1986; Sinev, 1992). Placed as separate subfamily in Agonoxenidae by Lvovsky (1996). Here excluded from Elachistidae-Parametriotinae, either belonging to Oecophoridae or Depressariidae.

***Nicanthes*** Meyrick, 1928: 395.

Type species *Nicanthes rhodoclea* Meyrick, 1928, by monotypy. Described in Cosmopterigidae. Placed in Agonoxenidae by Becker (1984b). Hodges (1997) checked the genitalia of the female and suggested that it belongs in Gelechioidea (possibly Gelechiinae), but not Agonoxenidae.

***Prochola*** Meyrick, 1915: 331.

Type species *Prochola oppidana* Meyrick, 1915, by original designation. Described in Cosmopterigidae. Placed in Agonoxenidae by Becker (1984b). Placed in Cosmopterigidae-Chrysopeleiinae by Hodges (1997).

The genus had already been removed from Parametriotinae by Hodges (1997), who recombined nine species with *Periploca* Braun, 1919: 261 (Cosmopterigidae-Chrysopeleiinae) and four species with *Tetanocentria* Rebel, 1902: 107 (a junior synonym of *Haplochrois* Meyrick, 1897: 299) in Agonoxeninae –Parametriotini, overlooking the fact that Sinev (1979) already recombined the same species with *Tetanocentria*.

Only two species were left in *Prochola* by Hodges (1997), but he wrote “misplaced” after one, so that only the type species remains.

***Vanicela*** Walker, 1864: 1039. [Australian 2]

Type species *Vanicela disjunctella* Walker, 1864, by monotypy. Described in Lepidoptera-Heterocera. Placed in Schreckensteiniidae by Fletcher (1929). Transferred to the Momphidae-Blastodacna-complex by Kasy (1976). Transferred to the Roeslerstammiidae by Dugdale (1988). The position in Roeslerstammiidae was confirmed by molecular studies by Heikkilä et al. (2015).

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